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GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

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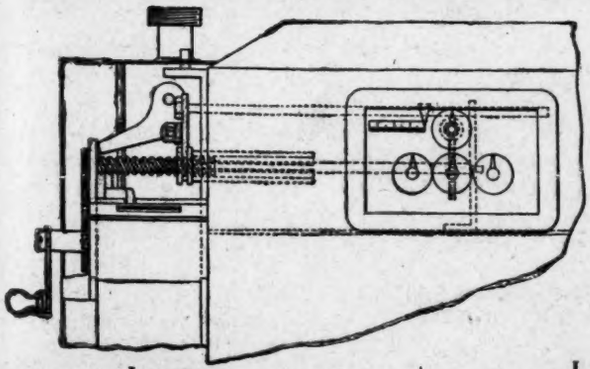

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VOL. CXLVII., No. 2936.] TUESDAY, AUGUST 19, 1919. [71ST YEAR.

EDITORIAL NOTES.

Dealing with the Situation—from the South Metropolitan Standpoint.

THE men responsible for the future administrative policy and technical work of the gas industry will be disappointed if they look into Dr. Carpenter's address at the meeting of the South Metropolitan Gas Company last Wednesday for a pronouncement defining more particularly what the Directors are proposing to apply to Parliament for in respect of their complete acceptance of the report of the Board of Fuel Research, and of the course it is in contemplation to take in regard to the revision of the sliding-scale. The Chairman did not allow anyone to penetrate through his speech the intentions of the Directors. Practically all he did was to accentuate their willingness to adopt the recommendations and suggestions—including the refinements as to inerts and sulphur compounds—of Sir George Beilby and his colleagues, as set forth in the original report. The application to Parliament is to be made next session; so that probably four or five months will elapse before we have in black and white a more precise statement, and then it will probably reach the industry in the first place through the deposited Bill.

Some comments for the information of the proprietors of the Company were made by Dr. Carpenter as to the lines of the recommendations which the Board of Fuel Research made, and which the Directors have accepted as the policy they are prepared to pursue. It is surprising that so few men in the gas industry see the inter-relation of the proposal of the Board that gas undertakings shall be free to name the calorific value of the gas that they can most economically supply, and the proposal to charge for gas in future on the heat basis. Dr. Carpenter puts the position in a nutshell when he remarks: The Beilby report "recommends giving freedom to gas undertakings to supply "whatever heating quality of gas they can most economically manufacture, always provided that they charge on "the basis of its heat energy instead of its volume." Contrary to the opinion of some gas men that the prepayment meter consumers are an obstacle in the path to the application of the heat-unit basis of charging, the Chairman's opinion is that "the proposal lends itself admirably to the "present system of charging for gas and fittings hire by "the medium of the slot-meter—a very important matter, "as the users of these appliances form the bulk of our customers." We are afraid that the hesitation of some gas men to depart from the traditional method of charging by the cubic foot is due more to the desire to avoid the trouble of making a change than to any serious objection that can be advanced to the plan. The trouble (if so it really is) should be weighed against the gain realized through the liberty to work to the quality of gas that is economically the best for each concern. The Company are going to suggest the adoption, in their own case, of 100,000 B.Th.U. as a "great" or "large" unit; and the cost of this, at the present price of gas, would be about 9¼d., which is regarded as quite an easily handled figure.

So far, the gas industry will generally say to Dr. Carpenter: "Go in, and best wishes for your success." But it is in the appendices to these proposals where there is the greatest feeling that the Company, working independently in their peculiar circumstances, are not assisting to serve in the best way the industry as a whole. Dr. Carpenter and his colleagues may, of course, assert that, while they recognize they are in a minority in this matter, they are persuaded that they are right, and so it is for them to proceed independently. They may also say that, if our conditions are peculiar to ourselves, then again all the more reason why we should act independently. But in the history of gas affairs, there has been no company that has fought more tenaciously for liberty than the South Metropolitan Company; there is no other gas undertaking to-day that is voluntarily prepared to put itself under such rigorous restraint as is this Company, on the advice of the Directors. The past and the present in this respect are separated by a deep and wide gulf. Besides the Chairman, there are two other technically gas-trained administrators on the Board; the other Directors are not. We shall be curious to see if the Wandsworth, Brighton, and several other Companies with which the two Directors in mind are administratively associated, will accept and ask for the same refinements as to inerts, sulphur, pressure, &c. We have our doubts—particularly as to the Wandsworth and certain other companies which could be named, in view of the trenchant letter published in our columns last week by Mr. H. E. Jones. But Dr. Carpenter provides an avenue of escape. He makes it clear that he does not suggest that 12 p.ct. of inerts should be the maximum for gas all over the country; but the gas companies supplying in and about London will be interested to see that it is his deliberate opinion that "in London, at any-"rate, there should be no difficulty in keeping within these "limits, when the coal supply is adequate." We see no difference between the other London Gas Companies and numerous gas undertakings in the Provinces which places the former in a position of special distinction in this matter. The suggestion as to purity, obligation as to the adjustment of consumers' appliances, and so forth, are all accepted by the Directors without any demur, as they have all been anticipated, and are the common practice of the Company. No one knows better than Dr. Carpenter, Mr. Honoratus Lloyd, K.C., Mr. Frank Jones, and Mr. Arthur M. Paddon, the danger of precedents in parliamentary matters. The gas industry has had its fill of disadvantageous precedents; and it has a right to expect that men of influence in the industry will not do anything, because of special circumstances, that will create precedents that will be irksome to the industry generally.

As to the sliding-scale (referred to in the address as the "Forster" sliding-scale), Dr. Carpenter gave no specific information as to the modifying proposals the Company intend to put before Parliament. But there was indication. We take it that the standard price and all the figures will be changed so as to co-ordinate with the heat-unit basis of charge, and that the equivalent standard price will be higher than that now obtaining, in view of the figures quoted by Mr. Honoratus Lloyd, and alluded to in a subsequent article on "Statutory Non-Profiteers." It will also be found that the price of coal will be a factor; for the Chairman declared that "the great object of the Forster sliding-scale "would have been more completely achieved had its basis "been a variable one dependent on the price of coal." Of course, the price of coal does not compass all the "variable" costs of gas manufacture; and there is some doubt as to whether variation on this basis alone would suffice. However, this is a matter for discussion; but illustration of our point is afforded by the hint of the Chairman that before next Christmas it may be necessary for the Company to increase the price of gas from 4s. 4d. to 5s., as well as by the figures quoted by Mr. Honoratus Lloyd. Gas companies are generally agreed that, with alterations, and the inclusion of some amount of flexibility in its constitution, the sliding-scale is a valuable instrument; and it is Dr. Carpenter's opinion that its principle will prove to be more than ever

a necessity as the only solution of the difficulties with which the industry is faced. With this, there is full agreement.

Sulphate Export.

There is only one other matter in Dr. Carpenter's address to which we will allude here. He is as strongly opposed as ever to selling the Company's sulphate of ammonia for export through the organization which the majority of the makers have thought it politic to form, and to work through. He wants for the Company a separate licence to export, and not to have anything to do with the organization in question. What special advantage the Company would achieve by separate dealing is not explained; what they are losing by not operating through the organization is frankly confessed. The Chairman asked the proprietors to observe from the balance-sheet that the stock of chemical products stands at nearly a quarter of a million sterling; and he added that this would be much better realized, and in the country's coffers. True; and in the coffers of the Company also. Without discussing whether or not the system is wrong, or has advantages for the country which justify it, the question may be asked why not, if there is no other course, realize the money through the organization? It is not a commendable act to cut off one's nose to spite one's face. Looking back to June, 1914, the stocks of tar, ammonia, and products, stood in the Company's balance-sheet at £71,078; at the end of last half year, at £230,460. The Gas Light and Coke Company and the Commercial Company are members of the organization in question. They do not now issue their accounts half-yearly; but, comparing the figures at the end of December, 1914 and 1918, there is not the disparity that the South Metropolitan Company show. In the case of the Gas Light Company, the tar, ammoniacal liquor, and products in stock at the end of 1914 were valued at £136,056; at the end of last December, at £131,356. In the case of the Commercial Company, the same item at the end of 1914 stood at £10,725; and at the close of last December, at £17,147. The comparable figures for each of the two neighbours have notable concordance. And why? It seems to us that a dear price is being paid by the South Metropolitan Company for adhering to a preference, to which they could revert when licences to export are things of the past.

A "Minimum" Seven Per Cent. Dividend.

It was clear from what the President of the Board of Trade said at the recent interview with representatives of the gas industry, that sooner or later we may expect the introduction of legislation dealing with the financial conditions of statutory undertakings generally, and with the Beilby report for the gas industry. That the revision of the financial conditions of statutory concerns would have to be taken in hand was recognized and promised by the predecessor of Sir Auckland Geddes. But the double-barrelled question is, when will a move be made in the matter, and when it is made what will be its nature? The Harrogate Gas Company (like the South Metropolitan Company) have come to the conclusion that things are now so critical that they cannot wait upon chance, and that they must at once do something for themselves by preparing an application to Parliament for next session. The matter was the feature of the address of the Chairman (Mr. F. Barber) at the recent meeting of the proprietors; and the argument and proposals are so full of life and initiative that we have reproduced the pertinent parts of the speech *in extenso*. It is not difficult for any gas company to make out a case for relief from the present debilitated conditions, which have been largely produced by the acts during the war of the Government or Parliament; and they are therefore in honour bound to do something to repair the mischief that they—wittingly or unwittingly, willingly or unwillingly—have wrought. And that "some-"thing" must be of a satisfactory character as judged by present circumstances.

The views of what should be done will be expressed in detail by the Harrogate Company in their proposed application to Parliament; and what they will suggest is something new. Broadly put, they propose to consolidate their three classes of ordinary stock on a 7 p.ct. basis; and 7 p.ct. is to be the "minimum" dividend. A maximum dividend is a common thing in gas and water legislation; but a minimum dividend is not. Then the idea is that any profits in excess of the sum required to pay the minimum dividend of 7 p.ct. should be subject to the sliding-scale as now. The Company would also be quite willing, if required, to have a maximum dividend of 10 p.ct. fixed—that is to say, the sliding-scale only operating between 7 and 10 p.ct. This would offer what some people consider to be necessary in the gas industry—an incentive to the best management. In other words, the standard dividend would become the minimum dividend; and the sliding-scale would not operate below it. It is understood that the Parliamentary Agents of the Company have discovered one precedent where the principle of a minimum dividend is recognized. The experience during the war has shown that a minimum dividend is necessary, and should be part of any future change. Parliament itself furnished a precedent for a minimum dividend in the Statutory Undertakings (Temporary Increase of Charges) Act; but its notion as to a minimum took no account of the new economic conditions, and the depreciated purchasing value of the sovereign. Had the purchasing power of the sovereign been doubled instead of halved, Parliament could not have done worse than it did for the industry, when it put a stop nearly at the bottom of the financial precipice over which the industry had been pushed, so as to prevent it dashing to pieces at the bottom.

There is one other object in referring here to the Harrogate proposals. We understand from Mr. Barber's speech and from a personal communication from Mr. F. H. Robinson, the Engineer and Manager, that there would be greater prospect of success if undertakings similarly circumstanced were prepared to support the Harrogate proposals. The exact form in which the support should be given is not stated; but, after reading Mr. Barber's address, those companies whose conditions are similar, and who approve of the Harrogate scheme, cannot do better than place themselves in communication with Mr. Robinson.

Statutory Non-Profiteers.

The Government have made their plans, and have got the authority of Parliament, for dealing with profiteering. They were driven forward in the matter by public clamour, indignation, and general labour unrest. With their object there has been large agreement and sympathy, except naturally from interested quarters. At the same time, not only from interested but from other quarters, there has been heavy opposition to the proposed methods of dealing with the pernicious trouble; and altogether a pretty tangle is the result. Profiteering has its antithesis; and with the extreme condition the Government should also, in the interests of the country and industrial enterprise, deal just as vigorously. Right and justice should impel them to do this. An outstanding example of the antithesis to profiteering is the gas industry, for which the Government is doing nothing, other than by indirect action or direct inaction to make things worse than ever for it—as witness the recent addition to the price of coal, the instruction as to coal wherever possible being conveyed by sea instead of rail at greatly enhanced cost, and the neglect to do something to give genuine relief to the capital of the industry. Intelligence comes as to the necessity, through new burdens and new decrees, of further putting the price of gas up anything from 6d. to 2s. per 1000 c.ft. We are hearing again this half year of more gas companies who were financially strong before the war, and whose business was never stronger than it is to-day, apart from finance, being in the position of having to take refuge under the Statutory Undertakings (Temporary Increase of Charges) Act. There is the public demand for gas, every nerve is being strained to meet it, but the undertakings are only just able to exist—nothing more. This they will not be able to do much longer with an impaired credit unless Parliament promptly comes to their rescue, and relieves them from their unique position among commercial concerns. The industry must to-day have the worst rewarded industrial capital in the whole country; and it cannot possibly live with a dividend of $2\frac{5}{8}$ or 3 p.ct.

Parliament ought surely to take steps to ensure that an industry under regulation from itself does not inherently and generally suffer from the application of these regulations. That the gas industry is doing so shows clearly that, in the changed circumstances, the statutory control is defective—that sufficient prevision was not brought to bear upon enactment when originally framed, and that it lacks the essential of flexibility to enable adjustment to altered circumstance. It is quite a legitimate thing to have regulation in connection with statutorily empowered concerns; but it is not

a legitimate thing that every quality needed in an industry such as gas supply should have had a *cul de sac* legislatively provided for it. This, to the disadvantage of the whole community, means too many dead-ends in industrial enterprise where avenues should exist to expansion. Such dead-ends can be picked out freely by any one identified with the technical and commercial affairs of the gas industry. Finance is only one part of our difficulties in the gas industry; but it is one of two parts that should be attended to by the Government, without delay or further pressure, if the industry is to live and serve. They have time to attempt to do something to protect the country against its insidious enemy, profiteering; they must find time to do something to restore just conditions to a statutory industry labouring under unjust ones of an unprecedented character, and which cannot now be righted by waiting and a passive attitude, because it is well established that much that is permanent is involved in the present economic conditions.

It was stated by Mr. Honoratus Lloyd, K.C., at the meeting of the South Metropolitan Gas Company last Wednesday, that, while the principle of the sliding-scale is right, its figures are wrong; and he illustrated this by pointing out that (without reckoning any other expenditure) the net cost of coal was last half year 16·3d. per 1000 c.ft.; labour, 24·7d.; and salaries, 2·7d. These figures alone amount to 3s. 7½d.; while the Company's standard price is only 3s. 1d. He says that Parliament knows the sliding-scale has broken down; and the President of the Board of Trade (Sir Auckland Geddes) has admitted it. We are not so sure about the knowledge of Parliament, particularly after the accusation of, and proof supplied by, Mr. Honoratus Lloyd as to the universal ignorance that exists as to the operation of the sliding-scale. But that the President of the Board of Trade knows and admits it, and recognizes the danger to the industry of its present position, the men of the industry are fully aware, from what he said at the time of the recent interview that delegates from the National Gas Council had with him. The learned King's Counsel quoted the words of Sir Auckland: "With regard to the financial "points which you have raised, I do not feel myself in the "position at the moment to say more than this—that, given "what I have said we recognize fully, the importance of the "industry, clearly steps must be taken in some direction "which will make it possible for the industry to carry on "and develop; otherwise, if it does not develop, it must go "backward as other things are doing." The trouble is the industry is going backward and losing more strength daily through its financial disabilities. The weakening of its financial status is cumulative; and it is so largely tethered to this deplorable circumstance that it cannot take energetic measures to set its house in order, and to make progress in service. The reconstruction and extension work that it could give out under other circumstances which would help to supply employment is very largely at a standstill; the service it could render to the community and to other industries is limited by a condition that is the product jointly of legislation and change of economic environment. Time is an important factor in rescue from any untoward condition; and the industry has the right not only to expect, but to demand, that the Government shall take immediate action (at any rate as soon as the autumn recess ends in October) to restore it to a sound position. There should be reward, and not punishment, for non-profiteers. But while the Government are arranging machinery for the punishment and exposure of profiteers, they are by neglect inflicting an atrocious wrong upon an industry that has a clean non-profiteering record. There are strange anomalies ever in the work of those whose business it is to make laws.

A Works Well Prepared.

A MUNICIPAL gas-works that has in good and normal times been consistent with its repayments of capital, and so has a low outstanding capital per million cubic feet of gas, is in an enviable position to-day; for it can spend money at even current costs for labour and material, incorporate plant that will bring works up-to-date, and still keep its outstanding capital at a figure per million cubic feet which will enable the sale of gas at a price that, as things go, should be extremely reasonable. This is so at the Stafford Gas-Works. It will be seen from a descriptive article (the first part of which is published to-day) that the Engineer, Mr. W. M. Valon, has been carrying out alterations and extensions which have given the power to work more economically and with higher efficiency, and therefore produce gas to the best advantage whatever may be the contemporary conditions. It may be expected that changes will come about in—this as a result of the report of the Board of Fuel Research—the character of the gas that may be distributed, and that disturbances through the vagaries of coal supplies in quality or delivery or labour difficulty will become still more uncertain with time. The responsible gas engineer is, consequently, in a more comfortable position than beforetimes when he knows that he has the support of a vertical retort-house, and that steaming will enable him to raise his production of quite decent gas to *x* quantity—perhaps putting into his mains in gaseous form 9 to 10 million B.Th.U. per ton of coal carbonized; that supplementing this he has a carburetted water-gas plant in excellent order, gas storage well up to need, and gas-compressing plant to send gas to outlying districts and to boost the supply in the urban area. This is the fortunate position of the Stafford Gas-Works to-day; and to attain this position has only raised the outstanding capital measured by current demand to £180 per million cubic feet capacity. The consumers, particularly in these times, are reaping the advantage of this; and had coal not risen in price as it has done, we venture to say that gas would shortly have been selling at Stafford at an unprecedentedly low price; it is low now under the ruling conditions. We do not say that Stafford is unique. But it is illustrative of an excellent situation for a works of the size; and therefore the Corporation Gas Committee and the Engineer may be heartily congratulated not only upon the condition as to capital, but upon the technical and manufacturing position of their plant, though there is still work to be carried out upon it—due to the dual circumstances of expansion of business and the trouble that exists somewhat generally with the substrata thereabout. The indications here of the work that has been, or is being, carried out is not all. Much else contributes to the material composing the descriptive article. Among other things, there is the introduction into gas-works practice of the MacLaurin centrifugal washers, to the high ammonia recovery efficiency of which testimony is given. Speaking of ammonia reminds of the South Metropolitan process for rendering sulphate of ammonia neutral, in which process Messrs. Parrish and Valon are jointly interested. Sulphate with an ammonia content of 25·65 p.ct., moisture 0·03 p.ct., and free acid *nil*, is a certificate of merit which will ensure consideration elsewhere.

Gas and Electric Power Competition.

THERE is another striking feature about Stafford experiences which was unearthed during our investigations there the other day. Gas and electricity are both under the administration of the Corporation; and there is free competition between them at commercial prices. Whatever electrical engineers may say about electricity being the power of the future, the manufacturers of Stafford have, in defiance of this interested prediction, settled pretty completely in their own minds, and from their own minds into their daily practice, a rule in patronage which works out to their advantage. And the Gas Department, also as a manufacturer, has adopted the same rule. Many of the factories of Stafford require power for steady loads and constant running. In these cases, gas cannot be beaten for economy. Where intermittent running is the condition, and convenience due to the disposition of machinery or other causes a consideration, there electricity comes in. But not otherwise. The same thing is found on the gas-works where gas is (as the figures in the article elsewhere show) incomparably cheaper than electric power, at the lowest power rates prevailing in the district, for the steady work of compressing gas for transmission to outlying districts. But for the intermittent work of the vertical retort plant, electric-motors come in. There are something like 300 gas-engines at work in the Stafford district—all running on town gas. One factory alone, with two 450-H.P. engines about to be erected, will then have 1350-H.P. on town gas; and by gas power the same firm produce their own electric current, *in situ*. There have been two suction gas-plants installed in the town; they have departed unmourned. There are gas engineers who have taken statements by electricians at their face-value, and have regarded the gas power business as having a bad outlook. This has not been the case at Stafford; and the result is seen in the power gas business not only being maintained, but largely extended. Those gas men who sit still, and let the power business slip from their hands, deserve

the loss. If there is recognition that there is a part for gas and a part for electricity to take in the economical running of factories, then there should be considerable developments for gas; and our electrical friends will find themselves in time comfortably installed upon their proper base, with manufacturers fully cognizant of the conditions which make one power agent preferable to the other from the costs or the convenience point of view. With the spread of power truths, manufacturers will not be so easily imposed upon as they have been in the past.

A Gas-Workers' Convalescent Home.

The Directors of the South Metropolitan Gas Company are to be congratulated on a fresh step that they have taken. It is a very humanitarian and practical one; but it is only the subject of a few modest words at the end of Dr. Carpenter's address at the meeting of the proprietors of the Company last Wednesday. Not a few of the men who have come back from the war show signs of chest trouble. For their benefit and others in the Company's employ, a suitable property has been taken at Mundesley-on-Sea; and it is being rapidly converted into a convalescent home. The Directors are satisfied that the new venture will be a success; and the warm approval of the employees is an assurance that the ties between Mundesley-on-Sea and South London (as represented by its gas-workers) will become of the closest order. Health, man power, and man efficiency are all closely allied; and so we see in this scheme an investment of the first order.

Nationalization of the Coal Mines.

Those who are asking for the nationalization of the coal mines of the country are looking askance at the direction things are going. They may ask, but the majority of the nation are of the opinion that they, and not a minority, have the right to determine this question. But, says Mr. Smillie, "we have what was practically a promise by Mr. Bonar Law (in the absence of the Prime Minister) that what the Coal Commission decided should be carried out; and a majority of the members of the Commission have proclaimed in favour of nationalization." But who were the majority? Mr. Justice Sankey and the little group of members who were, before the inquiry, perfervid advocates of nationalization! Mr. Smillie says that, if the Government allow their capitalist friends to frighten them, and prevent them carrying out the nationalization of the coal mines, then it will be the duty of organized labour, and certainly of the miners, to use their industrial power to force the hands of the Government. That is one threat, and not the only one. Supposing the Government did consummate the nationalization of the mines, then what would happen? Mr. Duncan Graham, M.P., told the Government in unambiguous terms when speaking the other day at the conference of the National Union of Scottish Mine Workers. He said: "If the mines became the property of the nation, the miners would need to be more determined than ever in their policy, and more vigorous in the trade union organization, because, instead of fighting local employers, they would be fighting the Government." The Government are to be pitied. It is plain that it does not matter which way they move—whether towards nationalization, or away from it—they will come under Union torture all the same, if such leaders as these represent the views of the men. The permanence and largest degree of the torture, it seems to us, would be found on the side of nationalization.

Yorkshire Coal Strike.

There is better labour news this week. The representatives of the South Yorkshire miners agreed that there should be a return to work this week; and the men are willing enough to do so, as they are utterly sick of the punishment that has been inflicted on them and their resources by the obstinacy of their leaders. They have lost heavily through this trial of strength over a matter that to them individually was trivial, but a matter of considerable importance to the Government and the country. Strike pay and the current rates of miners' wages are very distant relatives; and the last strike payment on Friday was only 9s. per man, and 1s. for each child. The accumulated funds of the District Union, it is reported, have been wiped-out; and the strike has cost the miners in hard cash (without the loss of wages) a quarter of a million. Truly, they have no cause for rejoicing over this position, nor over the fact that they could have had what they have obtained without striking. They must to-day be terribly sorry for themselves. Still out of evil good may come. The trouble and the issues will supply a striking object-lesson for other miners' unions when tempted to take an unreasonable course. Nor have the miners made friends among artizan classes. The number of unemployed in Yorkshire through the absence of industrial coal supplies has been very heavy; and the miners have felt that they have made themselves the objects of strong aversion. The West Yorkshire men are still out, and on matters of a very trivial nature. Evidently their leaders want to make a last stand, in the vain hope of scoring something to have in hand to testify to their sagacity. But there must have been wry faces among them when they heard that the Government and the owners positively declined to discuss these matters until the men were back at work. The unions dictate so long as there is money in the coffers, and the men are content with their strike receipts. But coffers are not bottomless, and contentment is not sustained long on short rations and empty stomachs.

Direct Action "Postponed."

Things have not been going well with the extremists among the labour leaders. "Direct action" on political subjects has not appealed to the leaders who are rational, who believe in democratic government, and who are persuaded that the strike weapon should be reserved for legitimate trade union purposes. The views of these men of light and leading in the labour world have been gaining ground among those who constitute the rank-and-file; and the extremists have not been making headway. To the former the country are indebted; for it has no desire for a period of anarchy which would have been the outcome of the success of ultraistic endeavours. At one time it looked as though "direct action" was going to bring about a deep and wide cleavage in the labour world. The events in Yorkshire, too, may have had some weight. The bad example set by the extremist leaders in advocating that certain trade unions should combine to undo (if thought fit) the decisions of democratic government has helped to convince the rank-and-file of the unions that they were acting quite logically and legitimately in (if they thought fit) setting at defiance their own elected leaders. This is not a development expected or desired. The extremists have likewise been reminded that while not long since they were objecting to the House of Lords dictating to the House of Commons, they themselves were proposing, through the Triple Alliance and direct action, to do the same thing. These and other matters have had their effect. The ballot on direct action has been postponed. Let us hope that wisdom will prevail, and that the idea of having recourse to such an unconstitutional mode of procedure will never again be revived.

HOUSEHOLD FUEL AND LIGHTING ORDER, 1919.

Explanation and Concession.

The following intimation is to hand from the National Gas Council of Great Britain and Ireland.

With the view of assisting the officials of gas undertakings in their administration of the above Order, the Assistant to the Controller has been interviewed by the Chairman of the Gas Divisional Officers.

The Assistant to the Controller stated that the gas allowance of 12,500 c.ft. per quarter was a minimum allowance for all consumers, irrespective of their coal allowance. He is, however, strongly opposed to any alteration of assessments which stood for the year ending June, 1919; but any reasonable cases would receive sympathetic consideration, and be dealt with on their merits. Any consumer, therefore, who elected to give up a portion of the coal allowance in exchange for gas will not now be entitled to more coal than was allowed last year, except under special circumstances.

With regard to coke, though the control of price remains, supplies may now be obtained without a certificate through a registered supplier. But, again, no increase shall be made in the allowance of household coal in respect of any coke taken under certificates issued under the 1918 Order.

With regard to Clause 56, the following minute has been issued to Local Fuel Overseers:

Where the Local Fuel Overseer is satisfied that the gas or electricity undertaking in his district is in a position to meet any increased demand which might arise, he may give a general assent permitting the undertaking to make new connections, and to fit additional appliances. The assent should be withdrawn if at any time the undertakings experience difficulty in meeting the demands. We would suggest Local Fuel Overseers and managers of electricity and gas companies work in conjunction in this matter.

PERSONAL.

Last week we published some particulars as to the presentation made by the employees of the South Suburban Gas Company to Mr. S. Y. SHOUBRIDGE, on his retirement from the position of Engineer of the works. We have since learned that the Directors, "as a token of their high appreciation and esteem," have given Mr. Shoubridge a very massive silver tea and coffee service and tray, of exquisite design.

The vacancy caused by the resignation of Mr. Reginald G. CLARRY, the Engineer, Manager, and Secretary of the Swansea Gas Light Company (to take up an important appointment in the steel industry), has been now filled by Mr. W. H. JOHNS, Engineer to the Sheffield Gas Company, who will be the Engineer and Manager to the Swansea Company. Mr. ERNEST ABLETT, the Assistant Engineer to Mr. Clarry, in addition, has been appointed Secretary to the Company. Mr. Johns was appointed to Sheffield from West Bromwich in May of last year, when he succeeded Mr. J. W. Morrison. Before going to West Bromwich he was at Malvern, Birmingham, and Bath.

The Directors of the Sheffield Gas Company, at their meeting last week, showed their appreciation of the excellent services rendered by Mr. HANBURY THOMAS, the retiring Managing Director, during his 36 years' connection with the undertaking, by presenting him with two beautiful silver rose-bowls suitably inscribed. Both the Chairman (Colonel H. K. Stephenson, D.S.O., M.P.) and the Vice-Chairman (Mr. B. G. Wood) spoke of the good work Mr. Hanbury Thomas had done during his long association with them. Last May Mr. Hanbury Thomas was presented with a number of tokens of respect by his staff; Mrs. Hanbury Thomas on the same occasion being given a diamond ring.

Mr. ARTHUR BROMLEY, late Manager of the Batley Corporation Gas-Works, but now the Gas Manager at Keighley, has been made the recipient of a beautiful oak clock and pair of Carlton-ware vases from the Batley Town Hall officials and gas-works staff as a mark of the esteem in which he was held.

Mr. R. BARKER, of Burnley, has been accepted by the Doncaster Gas Committee, subject to Town Council approval, as Outdoor Superintendent, at a salary of £250. Mr. F. N. HOWES is appointed Chief Assistant, at a salary of £230.

Mr. M. J. TRACEY, the Manager of the Wicklow Gas Company, has been transferred, on promotion, to Fermoy, and is succeeded at Wicklow by Mr. W. L. DELBY, of Magherafelt.

Mr. R. A. GRETTON (who is a pupil of Mr. H. Butterfield, the Manager of the Cowes Gas-Works) is the winner of the first prize and bronze medal in the City and Guilds of London Institute examination in "Gas Supply."

OBITUARY.

Mr. JOHN PHILLIPS, who had been connected with the Bristol Gas Company for no less than sixty years, died on the 9th inst. at Coalpit Heath Vicarage, the residence of his son. He had been in an enfeebled condition latterly; and a recent stroke hastened his end. He resigned his position as Secretary to the Company early in 1917, but retained to the end his Directorship. Working his way from grade to grade, he became Secretary in 1892; so that he had held this post for a quarter-of-a-century when he was regretfully compelled, under medical advice, to relinquish it. Mr. Phillips was 75 years of age. The funeral was at Coalpit Heath, last Tuesday. Among those present in the church were the following representatives of the Bristol Gas Company; Mr. J. H. Howell (Chairman), Alderman Fuller Eberle and Mr. W. Windus (Directors), Mr. S. E. Halliwell (Secretary), Mr. R. Robertson (Engineer), Mr. A. Edbrooke (Assistant Secretary), Mr. D. Irving (the former Engineer of the Company), Mr. W. Stagg, Mr. J. Conway, and Mr. E. Carey.

GAS INVESTIGATION COMMITTEE'S REPORT.

Reply to Criticisms.

PROF. COBB has forwarded to the Institution of Gas Engineers the following reply of the Research Sub-Committee appointed by the Gas Investigation Committee to criticisms of their second report, which was presented at the last annual meeting of the Institution—see "JOURNAL" for June 3, p. 607.

The inclusion of the last table in our report—summarizing results obtained with mixtures of coal gas and water gas—has been criticized; but, as stated at the meeting, these tests formed part of a systematic survey, and the results found a proper place in the report. A reason urged, however, for the inclusion of the table will not bear examination—namely, that, because the combustible "coal-gas water-gas" mixture contained more CO_2 than the coal gas alone, and because CO_2 has a higher specific heat than other gases, the flame temperature and illuminating efficiency obtained would necessarily be lower than with coal gas alone. The CO_2 with which we are concerned from this point of view is that in the products of combustion, and not in the combustible gas; and its influence on temperature is determined, not only by its specific heat, but by the heat of reaction in its generation. It is not correct to assume that the flame temperature is necessarily lower for water gas than for coal gas. Using data available for the specific heats of gases at high temperatures, the calculated flame temperatures for the coal gas and water gas used in the tests in question are 2010° and 2120° C. respectively.

Attention has been called to certain water-boiling tests carried out at Oldham with two gases of roughly the same calorific value—the one containing 14 p.ct. and the other 38 p.ct. inerts. Superiority in thermal efficiency was claimed for the gas with the higher percentage of inerts; the differences being of the order of 7 p.ct. From the published data, the thermal efficiencies (calculated in accordance with our usual methods) appear to be 65 p.ct. and 72 p.ct. upon the net calorific value respectively. These high efficiencies can be realized with some recent burners; but it is unfortunate that the actual rate of heat supply in B.Th.U. per hour for the tests was not also given, as this would have been a much better assurance that the two gases were being tested under comparable conditions than the eye estimation apparently used. A difference of 10 p.ct. would not be outside the range of a possible error with an eye adjustment so effected. Moreover, as concerns the general question of the influence of inerts, it should not be lost sight of that, in this comparison, a large proportion of the inerts in the poorer gas is made up of air. Now, air may be held to be approximately equivalent in effect to nitrogen when considering distribution, gas consumption, calorific values, and specific gravities, but not in its influence on the properties of the gas air mixture during combustion. Altogether we do not regard these tests as demonstrating the superiority of the gas with the high percentage of inerts, but rather as being not inconsistent (within the limits of experimental error in the methods employed) with the views of thermal equivalence expressed in our report.

On p. 417 of the "Gas World" for May 31, 1919, a deduction is made as to the relative merits of copper and iron kettles, which apparently may be justified by certain tables in the report, but which is not one of the Committee's deductions. We refrained from discussing this point; but attention has been drawn to it by a communication to some correspondence on p. 506 of the "Gas World" for June 14, the general trend of which agrees with our own views. We regard the difference between copper and iron vessels, as usually constructed, as being the least important factors in the situation. If claims are based upon the relative conductivities of copper and iron, it should be pointed out that these constants are given for heat transmission through a homogeneous block of the metal, and not through a compound system consisting of flame, gas films, metal diaphragm with any adhering soot, scale, &c., and water. The metallic diaphragm alone offers so small a proportion of the total resistance to heat-flow that the difference between one metal and another is unimportant. Differences in performance are to be accounted for, rather by rate of working, relative position of vessel and flame, thermal capacity of vessel, and relative proportions of burner and vessel.

As regards the desirability of revising the first report, and withdrawing certain of its conclusions because they are apparently at variance with those of the second report, it must be remembered that in the first report we were dealing with the effect of change in gas quality with consumers' appliances which could not be, or had not been, subjected to adjustment. This has already been dealt with by Prof. Smithells. The fact that certain difficulties with regard to aeration, pressure, and delivery of gas, can be overcome by very simple means does not invalidate any conclusions already made as to appliances not so adjusted.

Following Table XXXIV. of the report will be found a hint as to the constancy of the B.Th.U. per c.ft. of theoretically proportioned gas and air mixture for different grades, which was brought forward more prominently by Major Strange. Experimental evidence did not warrant more than this hint, and 94 to 98 B.Th.U. gross per c.ft. of gas-and-air mixture would represent present practice more closely than the 100 B.Th.U. quoted by Major Strange. Our own records indicate a fall to 83 B.Th.U. gross with very high inerts. However, for straight coal gas or coal gas and blue water-gas mixtures, 95 B.Th.U. gross is a useful average.

ELECTRICITY SUPPLY MEMORANDA.

Economies and Prices.

THE time has arrived when it may be acknowledged that values have definitely left the pre-war levels for higher ones. What was thought to be a high price for gas and electricity before the war will in future have to be looked upon as a low one; for costs throughout are not going to slide-back to anything like they were prior to the war. And there is no ground for anticipating that economies will be realized which, in their aggregate, will compensate for the high-level costs, though economies are highly important. They are immensely important to the electricity industry. We see the announcement that a steam engineer is to be appointed to take full responsibility for the supervision of the boiler-house at the Poplar generating station; and one ground for the appointment is that it is estimated that an improvement of 1 p.ct. in the thermal efficiency of the station is equal to £6000 per annum on the present fuel

expenditure. This is quite conceivable, as there are circumstances under which a 1 p.ct. improvement in efficiency would be equal to 1 lb. of coal per unit generated. The increased cost of money, coal, and labour will be universal over the whole range of materials and manufactured appliances, so that economies must be sought in every direction. But this must not be by the sacrifice of efficiency and durability through the purchase of inferior articles. This would, in the long run, recoil upon the undertaking in perpetual trouble and more rapid and higher charges for maintenance. Still every reasonable economy must be secured, in order that the prices which consumers will in future pay, and to which the war has partially, if not wholly, accustomed them, may not be higher than there is any need for. The strain upon engineers is going to be greater in future than in the past, through the effort to keep costs down to the lowest level consistent with sane administration.

The Flat-Rate Coal Increase.

But the Government are not doing anything to assist in producing economy. They are giving us a foretaste of their methods of industrial management and control in what they are doing in regard to coal. They believe in flat-rate increases per ton, without considering quality. This is a sore point with the managements of electricity undertakings, who have been largely buying slacks and low-grade coal; and those down south are now to use seaborne coal instead of rail-borne, with its extra cost. Gas undertakings are suffering in like manner—more particularly, in their case, from the latter cause. The electrical undertakings have been showing their resentment in the House more vigorously than the gas companies have been doing, notwithstanding that there are South-Coast towns to-day that, through the insane order as to seaborne coal, together with the 6s. per ton rise at the pithead, are having to put up the price of gas by 2s. per 1000 c.ft. It is all a serious business; but the Government appear to prefer to complicate the troubles of industry by making their own as light as possible. Replying to questions put on behalf of certain electricity concerns, Mr. Bridgeman, the Parliamentary Secretary of the Board of Trade, gives no hope of any amendment. The Board have been advised that there are certain practical difficulties in the way of grading the increase in the price of coal according to quality; and the Government do not see that they can modify the Price of Coal (Limitation) Act. Mr. Bridgeman added that he is advised that the proposal would involve a further substantial addition to the price of house coal. This consideration for householders using coal is touching; there is little regard for those who do the proper thing—burn gas for heating purposes instead of coal. Of course, as a certain total sum must be obtained by the Government to make coal control finance balance, it follows that, if the lower grades of coal had the 6s. per ton reduced, the higher grades of coal would have to be increased in price; and this would not suit gas undertaking, which use the higher grades of coal in order to obtain the maximum product, and so save tonnage, and some of the cost of conveying coal. It is all a most unholy mess; and the Government, the shipowners, and the miners have severally and jointly been concerned in producing it.

Bad Legislation.

The Government have shown a grand incapacity for dealing with industrial questions. This incapacity is not a new development; it is a bad survival of the procedure of the past. The gas industry supplies a ghastly example of legislative incompetence. The legislation of the past has stopped dead-short where foresight should have come in; it has had a cast-iron rigidity; and it has operated seriously against enterprise. As sure as an industry comes under statutory control, it will at once be placed in an impregnable legislative enclosure. This has kept the gas industry confined, when inducements should have been offered to it to seek much larger expansion of its service. This is what is recognized to-day; and the whole of our gas legislation in consequence now requires to be put into the melting-pot, and something new be produced. The electrical industry claims that all this applies equally to itself. It may do so, but not in the same degree. Its financial restrictions are not in the same street; and there are no regulations upon the energy supplied which govern the work of production as in the gas industry. Even in framing the new Electricity Bill, which is vainly expected to revolutionize the electricity industry, the Government were unable to make up its mind as to what it should do; and so the Bill is having its features as originally cast knocked out of all shape and recognition. Some of this transformation has been noticed in previous issues. Now further consideration by the Standing Committee has been projected over the autumn recess; and up to the present they have only succeeded in disposing of the first seven clauses. These, however, are probably the most contentious; and the thirty-eight remaining ones may not induce so much discussion. The violent hurry that was at one time thought necessary in connection with this matter is not so obvious now.

The Purchase Terms.

The purchase terms are the ones over which there was a pretty struggle; but the opponents of the Government's proposals did not break them down, or secure anything more than modest concessions on what are more or less points of detail. The sanctity of parliamentary bargains was the ground of contest. We have referred to the purchase proposals before. Neither the municipal nor the company owners think they are getting all to which they are entitled where there is purchase of generating stations and transmission lines. A district board is not compulsory now; it will only be imposed where there is not joint action by present owners in producing a satisfactory scheme for reorganizing the generating stations in a defined area. It was claimed by the companies that there should be adherence to the original parliamentary bargain as to the terms of transfer, or that compensation should be paid for unexpired tenure. The Government would not budge. They still hold that, as the electricity distributors will be getting current as cheaply (up to the extent of the capacity of the plants taken over) as they could generate it for themselves, no harm is being done to them. Their attitude is well disclosed by the statement that they must hold the scales evenly between the owners of the stations and transmission lines, by seeing that the shareholders get all to which they are entitled, while the public must not be robbed, nor must the scheme be damned by heavy liabilities at the outset. It is quite clear that the shareholders will not be getting all to which they are entitled. Their plant is worth a good deal more to-day than it was before the war; but the money they will receive—original cost less depreciation for companies, and unliquidated capital or arbitration on the basis of cost less depreciation for municipalities—will be worth much less than before the war. Of course, all the discussion over the purchase terms is merely precautionary. Not one of the owners knows that the generating stations and transmission lines will be taken over. If schemes can be produced satisfactory to the Electricity Commissioners which do not involve any parting with property, there will be no question as to purchase terms. But retention may be difficult, if consolidation of generating resources be a necessity.

A Safe Concession.

The electricity industry were much perturbed, when the new Coal Control Order came out, to find there was still a bar to the connecting-up of new consumers or of new appliances. Now it is announced in the electrical papers that, through the good offices of Mr. J. W. Beauchamp, Director of the Electrical Development Association, there has been relaxation of the restriction. The power is conferred upon the Local Fuel Overseer (or in the case of London the Divisional Officer for the Metropolitan area) where he is satisfied that the gas or the electricity undertaking in his district is in a position to meet any increased demand which might arise, to give general assent permitting the undertaking to make new connections, and to fit additional appliances. The assent is to be withdrawn if at any time the undertaking experiences difficulty in meeting the demands. The Coal Controller suggests that Local Fuel Overseers and managers of electricity and gas undertakings should work in conjunction in this matter. General assent is therefore necessary before gas or electricity suppliers can tap new business. But in current circumstances the relaxation appears to be of little value; and we do not see any marked electrical jubilation over it. Coal supplies and the prices of everything are sufficient brakes to an enthusiastic new business campaign; and the cost of electricity will be a deterrent to any exhibition of voracity in its consumption. The Coal Controller has made a pretty safe concession.

A Diesel Win.

The Diesel Engine Users' Association have had perseverance rewarded. Remark was recently made in the "Memoranda" upon their views as to the exemption from the operation of the Household Fuel and Lighting Order of the business of electricity undertakings using Diesel engines and therefore oil (and no coal) for the generation of current. The Coal Mines Department states that it is prepared to consider applications for exemption. There will not be a great rush of applicants, as most electricity concerns using Diesel engines have steam or gas engines also in commission—at any rate, during winter, the time of heaviest load.

Swiss Gas Association.

We have just received a copy of the "Transactions" of the forty-fifth general meeting of the Swiss Gas and Water Association, which was held at Zurich early in September last year. Under the presidency of M. Burkhard, of Lucerne, about 120 members and guests assembled; the principal papers presented being those of M. Escher, on the means adopted at Zurich for carrying on a gas supply during the war, and by Dr. Schlaepfer, on Swiss coal and peat. The volume arrived too late for any detailed account of its contents to be given this week; but any points of interest will be noticed in subsequent issues of the "Journal."

Temporary Increase of Charges Act.—An Order has been issued by the Ministry of Health, under the Statutory Undertakings (Temporary Increase of Charges) Act, to enable the Gainsborough Urban District Council to increase the price of gas from 5s. to 7s. per 1000 c.ft. They have also granted a further Order to the Borough of Doncaster, increasing the price from 4s. to 4s. 6d. per 1000 c.ft. Applications for Orders have been received by the Ministry of Health from the Bolton Corporation, Festiniog Urban District Council, Hindley Urban District Council, Maryport Urban District Council, Warrington Corporation, West Bromwich Corporation, and Wigan Corporation.

THE STAFFORD GAS-WORKS EQUIPPED FOR NEW DEMANDS.

A Large Scheme Effecting Change in Plant and Processes.

By good fortune it has been our lot to witness change at the Stafford Corporation Gas-Works over a long course of years—successively under three Engineers, Mr. J. Ferguson Bell, Mr. Hubert Pooley, and now Mr. W. M'Intosh Valon. That each Engineer has made advances on what his predecessor did has been no fault of the predecessor. Opportunity, invention, and fresh knowledge have had their enabling influence; and fortunately Stafford has had engineers who have been fully capable of making the best use of the prevailing technical conditions under local circumstances. Moreover, during all these long years, the engineers have had the privilege of working with a Gas Committee that, under good chairmanship (we recall Alderman W. H. Peach, Alderman Charles H. Wright, and now Alderman T. Westhead), has always been progressive. So the Gas Department has prospered, and the town has been well served; and the good service has contributed largely to the prosperity.

Output, Growth, and Successful Competition with Electricity for Power.

As a preface to the more important part of this descriptive article, it may be noted that, when the gas-works were taken over by the Corporation in 1879, the output of gas was 55 million c.ft. During the year ending March last, it was 280 millions; and it may be taken that it is now in the neighbourhood of 300 millions, which represents an increase since Mr. Valon, in 1912, took up the engineership, of about 100 millions. It is a sign of great healthiness that since the armistice, with the local firms having passed from war to peace work, there has been an increase in the demand at the rate of 6 p.ct. There is little fear of any set-back; for during an inspection of the works the other day, Mr. Valon mentioned in passing that one boot factory is putting in two 450-H.P. "National" gas-engines, which will be the largest anywhere in the neighbourhood utilized for the purpose of generating electricity! This one factory will then have gas-power totalling 1350 H.P.

This reference to business expansion has tempted us off the works; and, while off, abundant evidence is found that in Stafford the use of town gas for power is anything but in a moribund condition—in fact, its outlook is a remarkably pleasant one for the Gas Department, and so much the worse for the Electricity Department. This is not said in depreciation of the latter. It is due to circumstances. Stafford offers an excellent field for long-hour power use and good loads; and these are conditions under which electricity cannot compete with gas. This is the experienee not only at Stafford, but elsewhere where commercial prices for power gas and electric energy prevail. For intermittent work, electric motors come in; but for a steady heavy grind, the gas-engine is economically master of the situation. Take the gas-works itself, town electricity is being used for the intermittent work, including coal and coke handling, of the new vertical retort-house. But for compressing gas—a matter to which we shall be again referring later—for transmission to the outlying districts and for boosting purposes in the town, the work being continuous, electricity is economically completely "out of it." This is not the result of passing experience. Electricity has been in use at the Stafford works for compressing purposes for six years; but the motors are now idle, and merely stand-bys. Now 50,000 c.ft. of gas per hour can be, and is, compressed to 3 lbs. pressure at a cost for which electricity formerly only compressed 3000 c.ft.—the respective charges being the current lowest power rates ruling in the town—2s. 8d. per 1000 c.ft. for gas, and 1·63d. per KW.-hour for electricity.

While on this topic just another illustration. There have been two suction-gas plants installed in Stafford; and both have been scrapped in favour of town gas. The site of one of these was seen. It is a wood heel factory; and the owners, who are keen business men, installed a large suction-gas plant to work on the waste wood. It was running six months, when the suggestion was made by Mr. Valon that there should be a free test with town gas. The result was that the 190-H.P. engine gave them 42 H.P. more. The suction-gas plant was discarded; and now the firm are putting in another 100-H.P. gas-engine, also for running on town gas. This success was obtained in competition with electricity with (at current power rates) gas at 3s. and electricity at 1·7d.

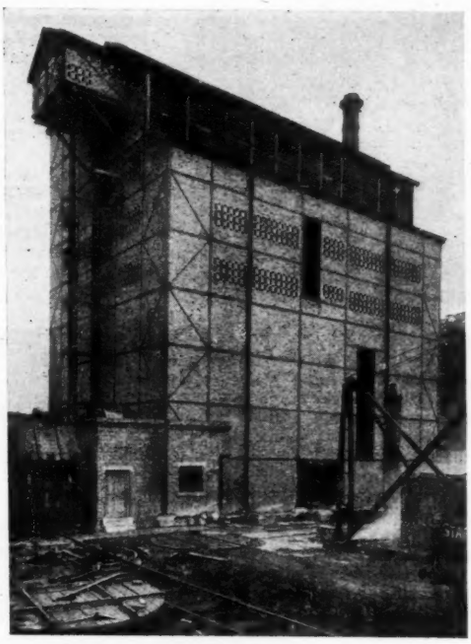
This is all very satisfactory. It shows that in power—the supposed stronghold of electricity—gas is destined to take large part for constant running; and therefore in towns where such conditions exist in the factories, the industrial power load (apart from heat requirements) must be a progressive one.

Low Outstanding Capital per Million.

The considerable increase there has been in gas output has made a very favourable impression on the capital account. The sum paid by the Corporation for the works in 1879 was £76,000. The additional capital expended up to March this year was £53,153—making £129,153, of which £91,138 had been repaid—leaving an outstanding debt on the undertaking of only £38,015, which, taking 280 million cubic feet as last year's output, is merely £136 per million. When the present scheme of extensions is completed, the outstanding debt will be (according to present estimates) just under £54,000, which will average not more than £180 per million. This is an extraordinarily good position, and will be the envy of many other gas engineers. It should be mentioned that this good capital position has been attained, despite the fact that £71,475, or considerably more than the outstanding debt, has been handed over to the district fund in aid of the rates.

A Scheme that Promotes Economy and Efficiency.

Interesting as is all the foregoing, it is more or less a digression from the main purposes of this article. But it shows strength; and it also illustrates how technical advance is being accompanied by commercial development. Perhaps other men would reverse the positions of "technical advance" and "commercial development." But no matter, whichever is correct there is every prospect of the conditions continuing. As we look back upon our visit, we see that, though the Stafford works fall far short of being in the front rank in the magnitude of demand upon it, it is to-day fully abreast of technical knowledge and efficiency, though, to round-off the scheme to the planned stage, there are yet certain additions and changes to be effected. We shall be referring to the scheme in detail. But the extensions and improvements that Mr. Valon has had in hand incorporate the economical use of coal and the increasing of output per ton by vertical retort working and steaming; and at the other end the provision of storage more in keeping with the maximum demand, as well as more efficient distribution, and bringing in business, through high-pressure transmission, from certain outlying districts. Intermediate, we find a new gas-washing plant, which has a high efficiency, as well as reorganization and improvement of the sulphate of ammonia plant, which, under the South Metropolitan Gas Company's (Parrish-Valon) system, gives a neutral sulphate, and dry and fine for the farmers' drills. But more of these matters as we proceed. The Gas Department is to be congratulated on the position in which it stands in meeting the claims of to-day for economy and efficiency, and in its preparedness for complying with the demands that industrial reconstruction and development and enlarged domestic use may make upon it for both its primary and secondary products.



THE VERTICAL RETORT-HOUSE AT STAFFORD.

The Trouble of the Site.

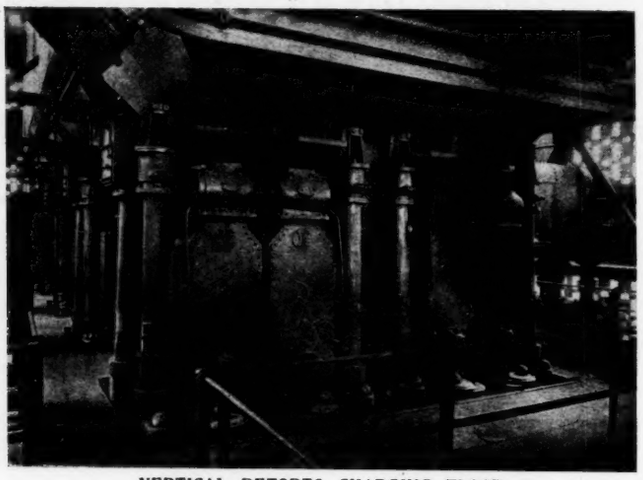
The Stafiord Gas-Works and the engineers have always suffered from a trouble which has become greater with the introduction of heavier plant. The site of the works lacks stability; but this is something that is more or less common to the whole of low-lying Stafford—with its river Sowe, its floods, its substrata saturation, and then the reflux, which causes foundations to have a looseness and shiftiness of which an engineer does not approve. When one site is practically as good as another in this respect, and there are certain advantages in staying where one is, there is nothing to be gained by making a move; but the engineer has to exercise his faculties in making the best of a bad job, by piling suitably to the load that has to be carried.

So it comes about that for the new vertical retort-house—which is the work of West's Gas Improvement Company, Ltd., and is therefore on the Glover-West system—some sixty-three 12-in. moulded reinforced concrete piles had to be driven an average depth of 36 ft., on top of which is a reinforced concrete raft, 3 ft. 6 in. in thickness. Adjoining the site of the new house, the piling and foundations have also already been provided for the installation of the coke-handling plant, about which something will be said later.

The Old Carbonizing Plant and the New.

The new retort-house forms an imposing feature of the works. It is continuous with the old retort-house, the three bays of which look low-pitched compared with the rearing height of the vertical retort-house. The old house is unemployed now, but a fall-back; and the plans are such that, as required, the vertical plant can be extended (and as demand is going it will not be long before a beginning will have to be made) by demolishing bay by bay the old house—all the auxiliary plant of the new house being of a capacity sufficient to serve one of double its output. The coal-elevator is equal to 25 tons per hour; and the hoppers are arranged for a 48-hour supply. Thus it is that duplicating the capacity of the vertical retort-house will initially not be such a costly matter as it was starting on the work.

The old house contains eight beds of eight horizontal retorts, and four beds of nines; the retorts being 20 ft. by 22 in. by 16 in. cross section. Here, again, we see the influence of foundations. Hand work has continued in this house, simply because the foundations were too insecure to carry the weight involved by machine work. Another noticeable feature is that all the retorts are built in 3 ft. sections, so as, when subsidence necessitates, to facilitate repairs and lessen expense. The ground area covered by the old retort-house is considerable in relation to that of the new house. In the old house there are 100 retorts of the dimensions mentioned; in the vertical house there are only 32 retorts —of course, of larger dimensions. But the total manufacturing capacity of the new house is considerably greater than the old one, which was 1,100,000 c.ft. The verticals will deal with about 96 tons of coal per day; but with steaming there is an elasticity about the production which makes it difficult to say precisely what is the capacity of the house. At present (the plant has only been in operation a few weeks) steaming is not being carried further than the production of 16,000 c.ft. of 520 B.Th.U. net gas per ton of coal passed into the retorts; but this make represents a capacity of upwards of 1½ million c.ft. a day, using about 80 p.ct. of North Staffordshire coal, and a little from Derbyshire and Yorkshire. Mentioning Yorkshire, reminds of a remark by Mr. Valon to the effect that the Yorkshire coal strike had not affected him much, seeing that the new retorts had compensated for the absence of deliveries from that district by making more gas per ton from the coal delivered from the other areas.



VERTICAL RETORTS—CHARGING FLOOR.

The Glover-West Vertical Settings.

The new house is much after the same style as other houses built by the West Gas Improvement Company for vertical retorts. It has a steel framework, the panels of which are filled in with 4½-in. brickwork; and the roof is covered with slates, supported on steel angle purlins. It is 64 ft. 2 in. long by 48 ft. 6 in. wide and 79 ft. 11 in. in height, measuring to the top of the dormer.

It has been mentioned that there are 32 vertical retorts. These are in a bench of four settings, each of eight retorts, arranged in units of four. The bench is braced together with steel girders; and above it are erected coal-bunkers capable of holding 48 hours' supply—the whole being complete with the usual feed hoppers, coke-receiving chambers, and coke-extractors worked by 5 H.P. "National" gas-engines in duplicate. A lift is provided in the retort-house for raising coke to the producers and for feeding the retorts when starting them to work.

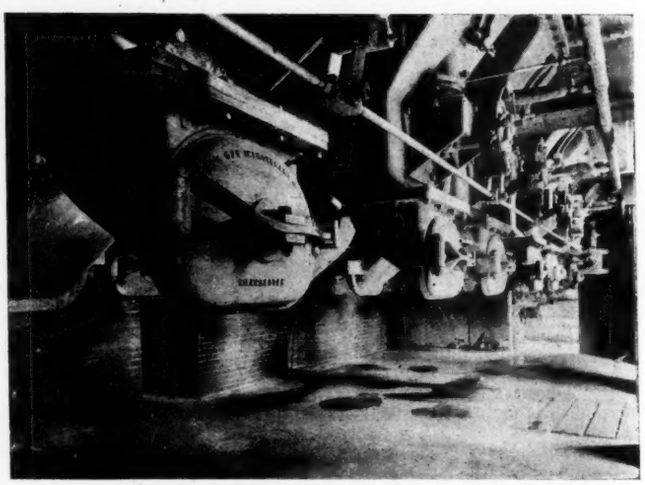
The mode of operation of the Glover-West system is well known to "Journal" readers. Regarding the heating, we see that in this installation, Mr. Valon prefers to work with open furnace doors. If working with closed doors, then when clinkering different conditions are set up by the greater amount of air passing through to the flues. As the method of heating the retorts is specially applicable to the process of continuous carbonization and steaming, it may not be out of place to reproduce the following succinct description:

The combustion chambers surrounding the retorts are superimposed. Each chamber is separately heated, and has no connection with the chambers either above or below it. The products of combustion after circulating around the retorts make their exit to a vertical duct common to all the exits from the combustion chambers; and, after passing through this flue or duct, they enter the chambers surrounding the top ends of the retorts. Through these top chambers the partially spent gases from all the combustion chambers circulate and heat the top ends of the retorts; the waste gases passing away to the chimney. The secondary air supply required for firing the producer gas at the points of combustion within the combustion chambers, enters and circulates around the base of the retorts, and in doing so the cold air extracts the heat, which is transmitted from the coke through the walls of the bottom sections of the retorts. This utilization of the heat recovered from the coke results in a very considerable economy in fuel consumption. Moreover, it enables the coke to be discharged in such a cool state from the coke-receiving chambers below the retorts that it does not need any quenching by water.

The length of time necessary for carbonizing the coal is regulated by adjusting the speed of discharge of the coke. This adjustment controls the length of time of carbonization, and is a valuable feature, as it enables the plant to be readily adapted to any kind of coal without interfering with the routine of the retort-house.

A signal advantage of the method of heating used in these settings is the facility with which the heats can be regulated to suit the introduction of steam for the generation of water gas *in situ*. For the satisfactory production of water gas, it is necessary to increase considerably the temperature of the lower combustion chambers, in order to complete the water gas reaction while avoiding an increase of inerts in the resultant gas. It will be seen, therefore, that the plant offers a particularly flexible instrument for the production of varying qualities of gas to suit varying conditions. Another point is that the regularity of the output from vertical retorts is found beneficial in other respects, as the purifying and other plants are under better control and more economically operated.

So much is all that need be said at this time of day regarding the Glover-West installation, the work in which is a full justification for the reputation of the contractors; and the smooth working of the installation is a further testimony to the technical merit of the process.]



VERTICAL RETORTS—DISCHARGING FLOOR.

The Coal-Handling and Power Plants.

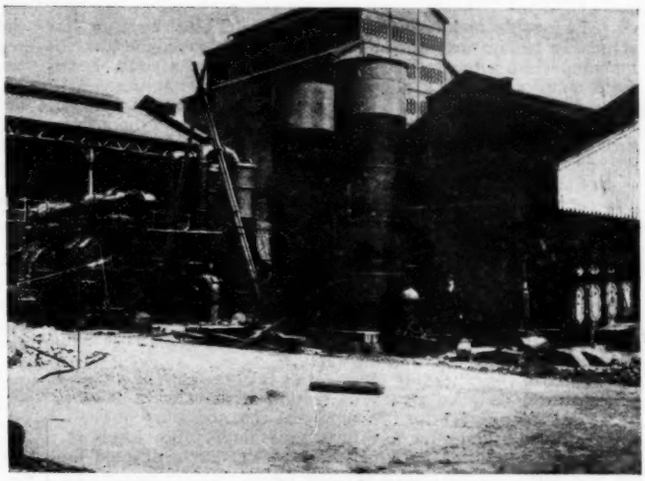
The photographic illustration of the exterior of the new house is full of interesting detail. It is in the foreground that the coke plant is to be built. On the left-hand side of the picture will be seen a truck of coal being tipped. The trucks have end discharge; and they are lifted by a hydraulic wagon tipper—pumping being direct on to the ram at 200 lbs. pressure. The coal falls into the grid-covered hopper, and is then fed by a rotary filler to the gravity bucket elevator, which carries it to the storage bunkers above the retort-bench, from which bunkers it passes to the coal-feed hoppers above the retorts.

The coal-handling plant is driven by electric motors, and so will be the coke plant when completed—the energy being supplied by the Electric Department, whose station occupies part of the site of the gas-works. It was noticed in the power-house that, instead of plaster and paint, the walls are being lined with cream-coloured tiles, relieved by green ones. This will only cost £80, which, at 10 p.ct., means merely £8 a year; and there will be permanent cleanliness, and no annual repainting needed. All the pumping is done in the engine-house; and for flushing the vertical retort mains a small ammonia pump is used, pumping into a 2000-gallon overhead tank, from which the flushing is carried on.

In connection with the delivery of coal, a turntable for the railway trucks has been put in, as seen in the photograph. A steam-driven haulage system is also being provided. The plan is for the railway engine to shunt the wagons into the works; and from the point at which the engine leaves them they can be dealt with by the rope haulage gear. Some prospective work is the relaying of the railway sidings.

Coke-Handling Plant.

All the plans have been made for mechanical coke-handling. The plant is on order; and the foundations are in. Instead of bringing the coke out of the house, it will be tipped into a coke-elevator boot; and the elevator will deliver the coke to a rotary screen situated over a series of bunkers, capable of holding twenty-four hours' make. By these means the dust will be taken away; and the coke will be graded into three sizes—breeze, household coke, and large coke. By means of levers the coke will be released from the hoppers into carts or wagons on the railway siding. Shoots will also be provided at one side of the hoppers for bagging purposes. An electric motor will drive the plant.



CONDENSERS.

Condensers and Works Mains.

The vertical retort-house is the latest and most important addition to the works. For the rest, we must continue to confine ourselves to the plant which is of recent, orcomparatively recent, installation. Lately two water-tube condensers have been introduced; atmospheric condensation having long been the previous practice. The water-tube condensers are circular; each being 23 ft. high and 5 ft. 6 in. in diameter, and capable of dealing with 1½ million cubic feet of gas per day. The shells and tubes are made of mild steel; and the necessary water is obtained from the river by steam-driven pumps.

The works mains have also been largely renewed or extended. Leading from the vertical retort-house to the condensers, a new 18-in. main has been put in; and, during the past two years, the system of mains connecting the exhausting plant to the carbonizing and condensing plant on the one side, and to the washing and purifying plant on the other has been renewed with 18-in. cast-iron pipes. The old mains which were displaced had been in use for about thirty years; but owing to subsidence, continual wear and tear, and internal corrosion, the pipes were found in many places to be exceedingly thin and dangerous to use. The new series of mains have been arranged with extra branches and valves, so that, when further condensing and washing plant is required, it can be connected direct to the existing mains without interfering with the manufacture of gas.

(To be concluded.)

GAS-WORKS POWER PLANTS.

JUDICIOUS MODERNIZATION.

By H. C. Widlake, A.M.I.E.E.

Plymouth and Stonehouse Gaslight and Coke Company.

(Continued from p. 338.)

Plant Working Hours.

A great factor bearing upon the question "to electrify or not to electrify" is the number of hours a particular plant is run per day or week. Take, for instance, the case of an oxide elevator steam-engine worked (say) only 8 or 9 hours per month. In such a case pipe losses can be minimized by closing a branch-valve near the source of steam supply; and while such an engine may be wildly extravagant when actually at work, it would never pay to scrap it on the grounds of fuel costs alone, owing to the very few hours per month it is in a position to exercise its wasteful proclivities. The saving effected by a change to an electric motor drive would be more than wiped-out by the capital charges involved in the installation.

In order to illustrate this point, the following table has been compiled, showing the effect of the hours of working upon the running costs of some unit of power driven plant operated by a 10 B.H.P. electric motor running under an average load factor of 75 p.ct. The factors taken into consideration in getting at the running costs are: Price of electrical energy (which has been taken at 1d. per B.T.U.), interest, and depreciation.

Working Hours.	Running Costs Per B.H.P. Hour.
One hour per month	19·60d.
One hour per week	5·20
One hour per day	1·50
5 hours per day	1·00
10 ,, ,,	0·99
16 ,, ,,	0·97
20 ,, ,,	0·96
24 ,, ,,	0·95

The number of working hours per day or week during which any particular unit of plant is in use has a great bearing upon the question as to whether the plant shall or shall not be included in a scheme of electrification; and this consideration will be further dealt with in a later portion of this contribution.

In the examples with which we have up to the present dealt, the decision as to whether an old type of power motor should be retained in service or scrapped in favour of an electric motor has been based upon the question of fuel costs alone. Now while this factor will be the decisive one in most cases, the question of lubricating costs is one we cannot afford to neglect, especially in connection with old-type gas-engines and steam-engines.

Modern gas-engines are very economical in this respect; but it is no exaggeration to say that many of the older type of engines will take forty or fifty times as much lubricating oil as would an electric motor of equal power. This is, however, a matter which must be settled with due regard to the circumstances of each particular case. The question of attendance is one upon which too much stress has been laid by people anxious to sell electric motors; and it may safely be ignored as not affecting the balance of the particular cases now being dealt with.

Another factor calling for consideration is whether a change-over to electric driving can bring about advantages which cannot be directly expressed in terms of pounds, shillings, and pence. For instance, a very old gas-engine may be a brute to start, although quite satisfactory when once under way. Consequently, a change in favour of the electric motor may be desirable in the interests of the elevator attendants.

Another advantage consequent upon the use of the electric motor in place of old gas and steam engines, but one which cannot be very well expressed in terms of pounds, shillings, and pence, concerns the conservation of space in works where room is badly needed. This, again, is a purely local consideration, the influence of which must depend upon the conditions of each individual case.

While it is, of course, a fact that an electric motor will work equally well on the floor, a wall, a sloping bulkhead, or even upside down on the ceiling, it is essential that a motor should be in a position which will admit of easy access for cleaning, inspection, and repair. People who talk in an airy way about putting a motor anywhere (so long as its shaft is level) should be made to maintain the machine in a satisfactory condition in some of the ridiculous sites so often selected as the result of their advice. An electric motor, like all other machines, requires a certain amount of cleaning, repair, and adjustment at regular intervals; and if it is so situated as to cause it to be neglected, trouble is bound to crop up.

Plant Capacity.

The extent to which the various units of the plant on a gas undertaking may be converted for electrical operation will depend upon the amount of electrical energy available—in other words, upon the capacity of the generating plant.

In the author's opinion, the majority of gas undertakings in this respect make a false move at the very start; and, as a consequence, the development of the power system is handicapped for years. This false move is generally brought about in the following manner: In almost every case the primary reason for the installation of electrical generating sets is that some form of electrically operated stoking machine has been introduced into the works; the generating set being part and parcel of the contract, and rated upon the basis of the load which will be provided by the stoking machine *plus*, perhaps, one or two conveyor or elevator motors forming part of the same contract. The interests of the contractor naturally enough do not extend beyond this point; and he puts down plant simply big enough to drive the gear he instals, and he would in all probability meet with a very cool reception if he raised the question of future development.

It is only when the plant is installed, and running fully loaded, that the works' manager awakes to the fact that, had the generating set been of larger capacity, it would have afforded him the means

of reducing his unduly high works' costs. There may, for instance, be two or three elevator or conveyor steam-engines, which by comparison with the new electrically operated section of the plant stand revealed in their true character as "steam eaters." Yet it is out of the question to scrap them in favour of electric motors, owing to the heavy capital outlay involved by the necessary extension to the existing generating plant, in order to enable it to cope with the load provided by the additional motors. The cost of the two or three motors themselves would be trifling—say £75 each. But the outlay which will have to be faced at the generation end is quite another matter; and in many cases it would be so heavy as to effectively scotch further development. If, however, due provision for this further load had been made at the time the rating of the original set was under consideration, the extra capital cost involved would have been a mere bagatelle (having regard to the size of the contract) as compared with the cost of installing an additional generating set to deal with the load which it is now desired to accommodate.

In order to illustrate this point, let us take the case of a works which, having installed a modern section of plant, puts down a 60 KW. generating set for the supply of the necessary power—making no allowance for any further developments. Later on, however, it is realized that great economies could be effected by the substitution of (say) three existing steam elevator engines by electric motors; and the fact is recognized for the first time that a 100 KW. and not a 60 KW. set should have been installed in the beginning.

We will assume that the cost of the original 60 KW. set was £650. Had it been foreseen that a 100 KW. set could have been profitably employed, this could have been purchased for £850, or only £200 more than was paid for the smaller unit. If, however, the proposal to drive the three additional elevators by electrical power involves the putting in of an extra 40 KW. generating set, a further expenditure of £400 will have to be faced, in order to obtain an increased capacity, which could have been provided for in the first place by the expenditure of an extra £200 in the cost of the first set installed.

The only certain way in which such an initial handicap can be avoided is to call in an engineer who possesses special knowledge of electrical power plants as applied to gas undertakings, and (acting on his advice) instal a plant in the first place of such capacity as will enable the maximum economy to be ultimately effected with a minimum of capital outlay. In this way, it will be possible to avoid those subsequent alterations and additions which are such an enemy to economy.

THE LOAD.

It has already been shown that in all cases where possible a clean sweep should be made of all simple non-condensing steam-engines of uncertain age and almost prehistoric design, and electric motors should be installed in their place.

Where a number of gas-engines are in use, the problem bears a somewhat different complexion, inasmuch as old gas-engines are not necessarily wasteful, while there are no heavy condensation losses to be totally eliminated. Such cases are best settled with due regard to the state of the engine, its hours of running, and the respective fuel costs of gas and electric power.

Assuming that it has been decided to bring as many as possible of the power using units of the plant under the electric motor drive, a start should be made with the twenty-four hour jobs—that is, the machines which are in constant operation day and night. The first unit of plant to naturally suggest itself under this heading will be the works exhausters. At this point it may be observed that it will be best to let these alone for the present, for reasons which were very fully dealt with by the author in an article entitled "The Application of Electricity to Exhauster Driving" which appeared in the April and May, 1916, issues of the "JOURNAL."

WASHERS.

The power-driven washers used for the purposes of purification and bye-product recovery offer a particularly fertile field for the achievement of fuel economy, inasmuch as such machines are usually in continuous operation. In connection with washers driven by either vertical or horizontal steam-engines, it is frequently an advantage to let the engine remain in position and to use its crank-shaft and fly-wheel as means for helping to bring the initial speed of the electric motor down to the figure at which it is required to turn the main shaft of the washer.

Fig. 4 illustrates this method very clearly as applied to a horizontal washer the engine of which was run at a speed of about 45 R.P.M. It will be seen that the connecting and eccentric rods of the engine have been removed, and the drive from the electric motor is taken *viâ* a countershaft (for the purpose of speed reduction) direct on to the engine fly-wheel. A further economy suggests itself in connection with any pump or pumps which may be in use in the neighbourhood of the washer, as these may be replaced by small and inexpensive belt-driven ram-pumps which may be placed immediately under the washer driving countershaft and driven therefrom by means of fast-and-loose pulleys. No considerable economy is to be effected by merely electrifying the washer and keeping its old steam supply main fully charged, in order to drive a small steam pump alongside.

PUMPS (SMALL).

The various pumps used about a fair-sized works constitute a serious source of loss both as regards their actual steam consumption and the condensation losses and leakage in the network of small and often unlagged steam-pipes from which they derive their power.

It is impossible in an article of this description to do more than briefly indicate a few of the methods by which economies may be effected. In many cases a steam-pump is fixed in close proximity to a rotary washer for the purpose of dealing with the liquor; and it is often possible to replace it with some form of belt-driven plunger pump, so arranged relatively to the driving gear of the washer as to enable it to be driven as required by means of fast-and-loose pulleys. A very cheap reliable form of plunger-pump for this class of work has been specially designed with a view to the requirements of gas undertakings, and may be obtained from Messrs. George Waller & Co.

In bye-product recovery plants on gas-works, it is no unusual thing to find a number of small steam-pumps installed all over the place, with more regard to the position of the vessels or apparatus into which they are required to deliver than to the run of steam-pipe necessary to drive them; and it is difficult to decide where to start with any scheme of modernization and fuel economy.

At the first glance, the easiest solution would seem to be to replace all such small pumps with belt or gear driven ram-pumps of the type referred to in the previous paragraph, and to drive each one by its own motor. But while this policy may be a very

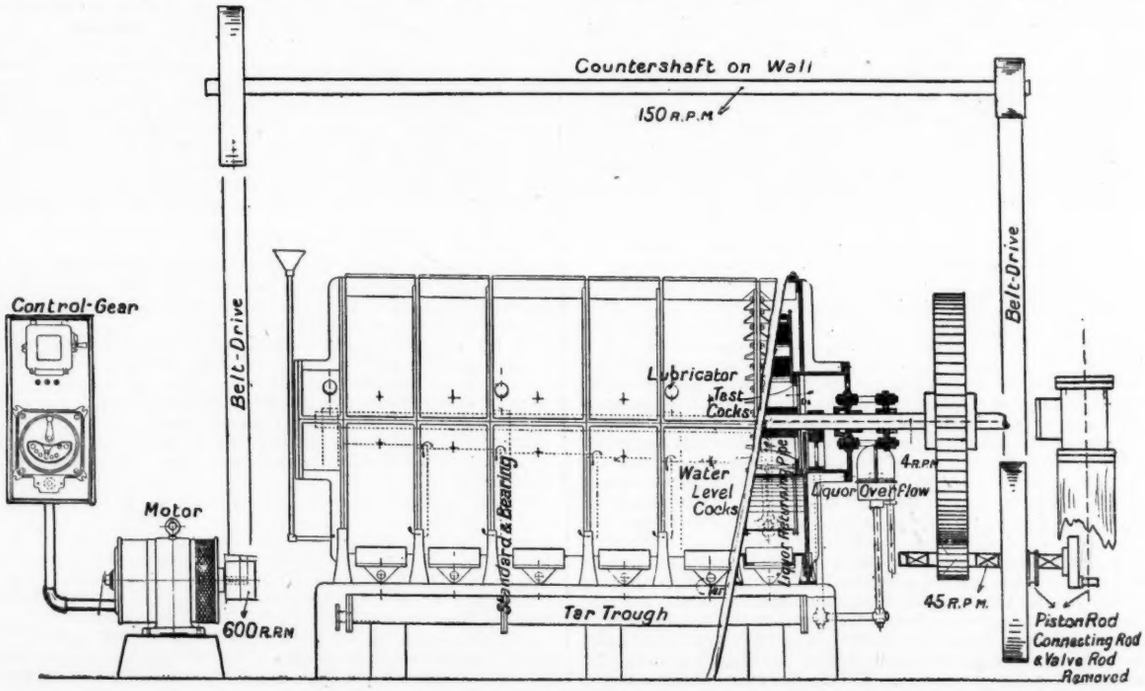


Fig. 4.

gratifying one to the electrical contractor, it is always a mistake to dump a number of small motors all over the place, particularly in an atmosphere probably charged with corrosive gases.

The conditions under which each individual pump works should be closely examined with a view to differentiating between those pumps which are always run at a constant rate and those whose speed required to be varied from time to time. In connection with the latter, a note should also be made of the range of working speeds required, and whether a few comparatively coarse adjustments in the speed of the pump will answer the purpose, or whether fine adjustments over the entire range of speed are essential. In this connection, the word of the chemist in charge of the plant should be excepted, as much money may be wasted by taking notice of the involved statements often made by process workers.

The constant-speed pumps should be replaced by an equal number of small belt-driven plunger-pumps which should be so grouped as to enable them to be operated from a motor driven length of line-shaft placed in a convenient position relative to the apparatus in conjunction with which the pumps work. This will involve moving some of the pumps a little away from their work, and altering the suction and delivery. But such an installation will be found to soon pay for itself. At the time of writing, the writer is engaged upon the task of stopping steam-waste in connection with a fair-sized bye-product recovery plant; and as a beginning he has put down an electric motor to operate a large horizontal washer hitherto driven by a steam-engine. The new drive to the washer is taken *vid* a line-shaft which has been installed in such a position, and of such length, as to enable it to also drive four or five plunger-pumps to be installed in place of the old existing steam-pumps, and also a pair of large agitators. In this manner, and in connection with this particular job, a 10 B.H.P. electric motor will do the work of two steam (or rather hot-water) engines and five pumps, each one of which was a fruitful source of waste.

Any scheme to modernize such a plant must depend to a large extent upon the number of pumps employed and their general disposition. For instance, in a large plant it may pay to arrange to drive the pumps in a certain number of groups—the grouping to be carried out with due regard to the duties and periods of working of each particular pump, so as to obtain the most advantageous results.

The problem of handling the variable speed pumps is necessarily of a different nature, as it is impossible to work such pumps direct off a constant-speed line-shaft. The solution of such cases must largely depend upon (*a*) the degree of speed regulation required; (*b*) the steps, coarse or fine, by which the necessary adjustments may be made; and (*c*) the frequency with which it is desired to effect alterations in the speed of the pump.

Where the finest degree of speed regulation is essential, the best course is to put down a variable-speed shunt-wound electric motor. But this is an expensive solution so far as concerns individual application to small pumps, and should be left severely alone wherever possible.

There are a number of mechanical methods by means of which variable-speed machines may be operated from a countershaft running at a constant speed—such as stepped-pulleys, sliding cones, elliptical gearing, change-speed boxes, &c.; and a solution of any particular case can generally be found in one or other of these methods.

Where a pump delivers into an open vessel, it is often possible to instal a delivery tank slightly above the level of the vessel, and to arrange for a bye-pass from the tank back to the suction-sump of the pump, and so obtain a variable net delivery with the pump running at a constant speed. In cases where a pump is used intermittently to fill a tank to a certain level and then cease working until the tank is nearly empty, it pays to instal a motor-driven pump in conjunction with float-operated auto-control gear. Such a pump will start-up automatically the moment the liquid in the tank falls to a predetermined minimum level, and will go on working until the liquid attains a predetermined maximum level, when it will automatically stop. This type of control is absolutely reliable, and abolishes the human element and the possibility of neglect to start or stop the pump at the right levels. The same type of auto-control gear may be used in connection with compressed air containers and hydraulic accumulators—being arranged to start and stop the motor synchronously with the attainment of both predetermined minimum and maximum pressures.

Reverting again to the question of driving variable delivery pumps from a constant-speed line-shaft, mention may be made of that type of belt-driven pump which is fitted with a mechanical attachment for varying the stroke of the plunger. Most of the leading makers of small power pumps manufacture a model of this type, which will be found to give good service.

(*To be continued.*)

A Large Gas-Fired Baking Installation.—What is said to be the largest gas-fired baking machine ever made is in process of construction by the People's Gas Light and Coke Company of Chicago. The machine will be 48 ft. long and 8 ft. wide, with an outer layer of white glazed brick. It is so planned as to afford one continuous process, from the feeding-in of the dough at one end to the arrival of the baked product at the other, ready for wrapping. The gas consumption averages 1,000,000 c.ft. a month.

NEW PATTERN "AJAX" TYPE GEYSERS.

TURNING to back volumes of the "JOURNAL," it is found that just three years have elapsed since an illustrated description appeared of the newly introduced "Ajax" geyser, with which it was then stated numerous gas undertakings had lately been experimenting [see "JOURNAL" for Aug. 8, 1916, p. 254]. It is no more than mere fairness to assume the attendance of success upon these experiments; for we have just received photographs from Ajax Heaters, Ltd., of Derby Avenue, North Finchley, N., which draw attention to the fact that new patterns of water-heating appliances constructed in accordance with the patent are being placed upon the market.

Simplicity of construction, facility for rapidly taking to pieces and re-assembling, and standardization of parts, strength, and good workmanship were among the features emphasized in our former notice. Now all patterns of the geysers can be supplied in aluminium throughout—with its saving in weight, and advantages over copper from the point of view of cleanliness and appearance. The "Derby" has been introduced as a popular heater at an intermediate price. It has the standard points of the "Ajax," and is specially suitable for Government housing schemes, &c. Then (also with the same features as the "Ajax") there is the "Ideal" lavatory basin geyser, which has been designed to meet the demands of surgeons, dentists, &c., for sterilizing instruments. Its dimensions are 14 in. high by 6½ in. diameter; and it is supplied complete on a bracket for fixing to the wall.

Direct Recovery of Pitch and Tar Oils from Crude Coke-Oven or Coal Gas.

The "Journal of the Society of Chemical Industry" publishes an abstract of an article on this subject, by Herr W. Emminghaus, in the "Journal für Gasbeleuchtung, Vol. LXII., pp. 226-29. It points out that the process introduced by Feld, in which the crude gas is subjected to cooling in stages, accompanied by simultaneous mechanical washing, has been in successful operation for three years in connection with an installation of sixty Koppers coke-ovens—briquette pitch and tar-oil being recovered. The tar-oil resembles the crude oil obtained in tar distillation. The gas from the ovens is led into a Feld centrifugal washer, supplied with steam. Condensed tarry matter is used as the washing fluid, and is employed in the form of a fine spray. About 70 p.ct. of the tar is recovered in the washer. The gas enters the washer at about 180° C., and leaves at about 120° C., to an impact purifier (tower packed with Raschig rings), wherein the gas is again washed with some of the condensed products—the remainder of the tar and some oil being recovered. The tar and oil are removed at intervals of from eight to twelve hours. The gas passes from the washers to cooling towers, where it is cooled to atmospheric temperature; oil and water being condensed, and collected in a separate vessel, where the ammoniacal liquor is separated from the tar as usual. The cost of operation of the plant, including interest and amortization, over 1¼ years (1916-17), amounted to 2·55 marks per ton of recovered products. The advantages accruing to the process of fractional condensation include economy of fuel and material.

Gas-Fired Steam-Boilers for Printers.

There is a description in the "American Gas Engineering Journal" of two installations in printing offices of Ofeldt gas-fired steam-boilers, which have proved highly successful. In the first case, where it was desired to dry the ink almost instantaneously, as the paper passed through the press, many experiments were originally made in the use of gas-flames in cylinders; but it was found that this was dangerous because of the inflammability of the ink employed. The industrial department of the Consolidated Gas Company thereupon suggested this scheme. The boiler not only generates live steam for use in the steam-pipes and cylinders of the press, but there is also a hot-air box heated by the boiler, attached to which is a blower that distributes the hot air over the printed sheets as they pass over the top of the press next to the steam-pipes. The top of the press is about 10 ft. long, and running crosswise are as many ¾ in. steam-pipes as it is possible to place; while at the end of the press is another set of steam-pipes, and a large cylinder also fed with live steam. The boiler automatically keeps these pipes at an even temperature. After the gas is lighted in the boiler, it requires no further attention. In the second case, the same gas company installed a similar boiler, where the matrix presses have to be heated to a certain uniform temperature in order to get the best results. There was much experimenting with different methods; but while it was easy enough to get the required temperature, it was hard to keep it uniform. The pipes from the gas-fired boiler are attached to the matrix table; and complete satisfaction is given by this method. When the gas is once lighted, it automatically maintains the desired temperature for hours at a time.

On the invitation of Mr. R. J. Milbourne, the General Manager of Messrs. C. & W. Walker, Ltd., the members of the Midland Junior Gas Association will visit the Donnington Iron-Works on Friday of next week, the 29th inst.

BENZOL IN COAL GAS.

The paper by M. E. Sainte-Claire-Deville read before the Metz Congress of the Société Technique du Gaz consisted of a review of the experimental studies of this question which M. Deville has carried out for over thirty years in his position as head of the Experimental Works of the Paris Gas Company. As he pointed out in almost his closing sentences, the gas engineer now regards benzol from the point of view of its removal as compared with the study of its retention, which is a matter of importance with gas rated on a photometric basis. Nevertheless his researches—made as they have been under the most accurate laboratory conditions which it was possible to obtain—possess a value at the present time which is in correspondence with the eminence of their author. M. Deville's epitome may be said to owe much of its value to the fact that it is a selection of essential and representative results, such as only an experimenter who has devoted more than a quarter of a century to the subject could safely make. His paper requires to be read from this standpoint; and it is then seen to form a contribution to the present knowledge of benzol in gas such as gas engineers will wish to have for reference. Moreover it usefully interprets and supplements past communications by M. Deville, by reason of its emphasis of important matters, and its correlation of one branch of the subject with another. In this connection it requires to be observed that, in speaking of benzol, M. Deville includes all hydrocarbons of the aromatic series, from benzene to cymene; while he uses the term "benzine" to denote a mixture of light aromatic hydrocarbons distilling from 79° to 83° or 84° C.

Fundamental Experiment.

The fundamental experiment upon which M. Deville's work on benzol has been based is that in which the volume of air (or gas) at 0° C. and 760 mm. which will take up a given weight of "benzine" has been determined, or rather, inversely, the weight of "benzine" which can be taken up by a given volume of gas. In making these tests, a measured volume of dry air was passed through a flask containing a known weight of pure "benzine." Thus charged, it was passed to a weighed glass coil immersed in melting ice; then through two weighed coils immersed in a mixture of ice and salt; and lastly through a U-tube at a temperature of about − 70° C. Two typical results of the test in this form are shown in Table I.

Table I.

		I.	II.
Volume of dry air treated (0° C. and 760 mm.)		54·9 litres	47·0 litres
Loss in weight of benzine flask		9·119 gms.	11·188 gms.
Increase in weight	of coil at 0° C.	2·412 gms.	5·284 gms.
	of first coil at −21·7° C.	5·485 ,,	4·815 ,,
	of second coil at −21·7° C.	0·020 ,,	0·013 ,,
	of condenser at −70° C.	1·280 ,,	1·115 ,,
Total, practically equal to loss in weight of carburetting flask		9·197 gms.	11·227 gms.

Thus, by cooling air to −70° C., the whole of the "benzine" is removed—its vapour pressure at this temperature being *nil*. Moreover, the passing of gas, even at a rapid rate, through a glass tube at −70° C. is sufficient to condense the whole of the vapours. Calculating the results to 1 cb.m. of dry air at 0° C. and 760 mm., the result is that 1 cb.m. of air under the experimental conditions contains 23·5 gms. of "benzine" after cooling to a temperature of −21·7° C.

Excluding the first cooling tube at 0° C., tests of coal gas from coal of many different kinds are summarized in Table II. The tests included under A and B apply to gas as sampled at the beginning and mid-period of carbonization—that is, a quarter of an hour and two-and-a-quarter hours after the closing of the last retort. It was therefore necessary, in testing these gases, to confine them for some time in a small gasholder of about 300 litres. The water of this gasholder (as is set forth in a later paragraph) dissolves, even during a short period of contact of the gas with it, an appreciable proportion of benzol. M. Deville points out that this fact, which would have constituted a great error in the estimation of benzol, is on the contrary a favourable factor in sharply drawing conclusions from the figures in the table. It shows that when a gas contains little benzol it is only on the weight shown by the condensers at − 21·7° C. that the loss falls. In the tests denoted as C and D the gas was sampled from the ordinary mains and was not subject to the loss just mentioned.

Composition of Condensates.

Passing to the question of the composition of the benzol liquids condensed at the various temperatures, the condensate at − 70° C. is deposited in the crystalline state immediately on contact with the wall of the U-tube. The crystals melt on the tube coming to the ordinary temperature, forming a colourless liquid of a density 0·881 of which about 50 gms. were collected from the 18 tests represented by the above table. This liquid, after fractionation and rectification and allowing for 2 p.ct. of loss, was found to have the following composition:

Table II.

Description of Gas Tested.	Weight of Light Oil Condensed per cb.m. of Gas.	
	a—at −21·7° C. Gms.	*b*—at −70° C. Gms.
A.—Gas taken from outlet of works meter 15 minutes after charging seven retorts of bench—		
Commentry gas	4·205	23·996
Dudweiler gas	6·038	23 876
Harraton gas	10·324	23·831
Courrières	9·382	22·404
B.—Gas taken two hours later—*i.e.*, 2½ hours after charging—		
Commentry	7·663	23·217
Dudweiler	4·155	23·961
Harraton	9·003	24·756
Courrières	10 824	22·217
C.—Bourges gas—average	5·025	23·725
D.—Average gas of the Paris La Villette Works taken at works outlet	18·307	23·553
	16·475	22·303
	16·147	23·447
	16·666	23·148
	16·898	22·906
	16·394	23·479
	16·561	23·219
	14·660	22·250
	14·431	23·475
Mean	16·282	23·087
Mean of the figures in the table	..	23·220

Distilling from 70 to 79° C.	2 p.ct.
,, ,, 79 ,, 83° C. (pure "benzine")	88 ,,
,, ,, 83 ,, 115° C. ("benzine" and toluene)	10 ,,

The condensate in the tube immersed in ice and salt is also in crystals which melt to a more or less yellowish brown liquid of density 0·864. Distillation of more than a litre collected from a large number of tests showed it to have the composition shown in Table III.

Table III.

Boiling Point. °C.	P.ct.
78— 80	2·49
80— 84	58·36
84— 95	5·82
95—105	2·73
105—115	14·23
115—125	4·27
125—145	7·35
145—165	2·49
Viscous residue, phenol, naphthalene, &c.	1·26

On the assumption that the hydrocarbons condensing at −70° C. exist in average gas to the amount of 23·5 gms. per cb.m., and those condensing in ice and salt to the amount of 16·2 gms. (the average figure for a number of tests), 1 cb.m. of normal gas contains 39·7 gms. of benzol; and this benzol would have the composition indicated in Table IV.

Table IV.

		Boiling Point. °C.	Composition P.ct. by Weight
Distillate lighter than benzine		70–80	2·20
Gas benzol proper	Benzine, pure	79–84	75·90
	Benzine, toluene, &c., not separable	84–105	9·41
	Toluene	105–115	5·81
	Xylene, cumene, &c.	115–165	5·76
	Viscous residue, phenol, heavy oil, naphthalene	—	0·92
	Total		100·00

An analysis of benzols condensed directly at − 72° C. in the course of tests of coals in 1918-19 is:

	P.ct. by Volume.
Boiling below 78° C.	3·75
,, from 78 to 84° C.	59·02
,, ,, 84 to 109° C.	30·27
,, ,, 109 to 115° C.	3 12
,, ,, 115 to 136° C.	2·77
,, ,, 136 to 235° C. + tarry residue	1·07
	100·00

These condensates are somewhat poorer in toluene, xylene, &c., than the preceding, which were obtained before the adoption of the system of abrupt condensation of tar in the cold, which has the effect of enriching the tar in naphthalene and heavy hydrocarbons at the expense of the gas. This benzol also appears to contain a proportion of hydrocarbons boiling at from 70° to 80° C.—slightly greater than previous determinations. But this is a point to be further studied. It would be of interest to subject the gas passing from the condensing tube at − 72° C. to still

lower temperatures. No doubt—especially with cannel gas—there would be some condensation of hydrocarbons of the saturated series; but there would be no further "benzine."

As regards the estimation of benzol in debenzolized gas, M. Deville repeated that the method formerly used by him, of cooling to −21·7° C., was obviously not applicable to gas containing less than 23·5 gms. of benzol, which is less than the 23·5 gms. of pure "benzine" adopted for the correction of the test. Tests made in 1916 by passing more or less debenzolized gas first into a cooling tube at − 21·7° C. and next into a tube at the temperature of carbonic acid snow—namely, − 72° C. gave the results indicated in Table V.

TABLE V.

Mean Results with Gas from La Villette Furnaces.	Benzol per Cb.m.		
	Weight Condensed at − 21·7° C.	Weight Condensed at − 72° C.	Total.
	Gms.	Gms.	Gms.
Group A—No benzol extraction	11·76	23·50	35·31
,, B—Partial ,, ,,	4·71	22·84	27·55
,, C— ,, ,,	2. 88	21·41	24·29
,, D—Greater ,, ,,	1·13	19·01	20·14
,, E—Very good ,, ,,	0·00	11·00	11·00

Thus, in practice, the method of condensing at − 21·7° C. ceases to be accurate as soon as the benzol content of the gas falls below 27 gms. per cb.m. M. Deville added that, in the course of forty years of practice, he had never met a normal coal gas containing less than 30 gms. of benzol. The method of cooling to − 21·7° C. was, therefore, defective only in the case of special gases, such as those which had been debenzolized, those taken at the end of carbonization, mixtures of gases, &c.

DETERMINATION OF BENZOL PER VOLUME OF GAS.

In determining benzol by weight, the quantity which is separated is too small to allow of fractional distillation. In each case, however, an exact calculation can be made of the volume of vapour corresponding to a given content by weight. For this purpose, there may be used a chart based on the mean approximate composition of benzol. In practice, it can be assumed that the weight of 1 litre of benzol vapour is equal to that of a mixture of 0·750 litre of pure "benzine" and 0·250 litre of toluene—that is, 3·73 gms. By dividing by this figure the weight of benzol found, the result is the percentage by volume.

ILLUMINATING AND CALORIFIC EFFECTS OF BENZOL.

M. Deville briefly reviewed the part played by benzol in the illuminating and calorific powers of gas. Gas cooled to − 21·7° C. can still be tested on a photometer by the method of Dumas and Regnault. The mean results obtained are:

Illuminating power of untreated gas	104·3 litres
Benzol removed at − 21·7° C.	16·14 gms. per cb.m.
Illuminating power of cooled gas	124·6 litres

With gas cooled to − 70° C., it is impossible to obtain an illuminating power of 1 carcel in the bengel burner, no matter what the consumption of gas may be. By removing the carcel type to 1·40 metre from the screen (thus permitting of the measurement of the consumption of the bengel burner for an intensity of 0·51 carcel) the result is as follows:

Illuminating power of untreated gas	104·9 litres per 1 carcel
Benzol removed from gas	39·93 gms. per cb.m.
Illuminating power of cooled gas	141·9 litres per 0·51 carcel = 278 litres per carcel

From these figures, it is seen that benzol of itself represents 65-100ths of the illuminating power—thus making it a most important factor when gas is tested by the photometer. As regards calorific power, the contribution of benzol to the latter may be made by calculation. Taking at 9 calories the heat produced by the combustion (water as steam) of 1 gm. of benzol, it is seen that in 5000-calorie gas containing 40 gms. of benzol, the latter accounts for only 360 calories, equivalent to 7·20 p.ct. of the total calorific power. The influence of benzol is much more important from the point of view of illuminating power than of calorific power.

SOLUBILITY OF BENZOL IN WATER.

M. Deville proceeded to review the question of the solubility of benzol in water which, he said, was one which did not seem to have attracted sufficient attention from gas chemists. He cited some figures for the solubility of benzol (*i.e.*, benzol vapour) in water. In an experimental meter of five-light size, and charged with pure water, there was from the start absorption of benzol. The water became saturated only after the passing of 1600 litres. From this point onwards, any gas containing more benzol lost a little of its benzol, while any gas containing less took up a little benzol from the meter. The maximum loss at the start could be 4 gms. per cb.m.

In an experimental gasholder of 350 litres capacity, standing over pure water, gas lost more than 14 gms. per cb.m. in the course of two hours. Tests made before reaching the inlet of the gasholder showed 14 gms. at − 21·7° C. At the outlet, similar cooling showed the absence of benzol. Cooling to − 72° C. would be necessary in order to estimate the exact loss. Even after a circulation of gas equal to thirty times the capacity of the gasholder, storage under the bell for two hours still sufficed to produce a loss of 4·2 gms. of benzol per cb.m. It is, therefore, evident that the use of small experimental gasholders, such as are commonly made, should be absolutely eliminated from experiments on the quality of gas. For this reason, gas samplers of 2 cb.m. in use at the Experimental Works of the Paris Gas Company are of a special type found, after regular use, to be free from error.

As regards the action of water on gas in the works' gasholders, a new holder of 30,000 cb.m. capacity was taken into use on Nov. 21, 1889. During the first 140 days, tests were made of the benzol in the gas at the inlet and outlet of the holder. It was found that the gas on the average lost 5·92 gms. of benzol per cb.m. during the first 32 days; but during the last 22 days, it lost only 0·67 gm. The total weight of benzol absorbed by the 62,000 cb.m. of water contained in the tank of the holder, in the course of the five months required for their saturation, was 19,940 kilos, equivalent to 310 gms. per cb.m. Thus, at the end of a sufficient time, equilibrium is established between the vapour tension of the benzol in the gas and its tension in the water. If the gas contains 40 gms. per cb.m. and the water 300 gms., the tension in the water is 7·5 times greater than the tension in the gas—that is to say that the coefficient of solubility of benzol in water at the prevailing temperature is 7·5 times higher than that of other gases, and in particular of carbon dioxide, which at 15° C. does not exceed 1. Once equilibrium has been established, it should theoretically be disturbed as the benzol content of the gas rises or falls, with loss in favour of the water in the first case and gain at the expense of the water in the second. This phenomenon was studied at La Villette Works in 1887-8. For fourteen months, daily tests were made of benzol at the inlet to the meter and at the outlet. The maximum loss of benzol which was observed during a single week corresponded with figures as follows:

	Benzol per Cb.m.
Gas, as made	41·51 gms.
Gas, as distributed	39·35 ,,
Loss = 2·16 gms. = 5·20 p.ct.	

This maximum corresponded to the consumption (which was very exceptional at that time) of English and Scotch cannel coal at the works. The maximum increase was that measured over a period of a week in February, 1888:

	Benzol per Cb.m.
Gas as made	36·00 gms.
Gas as distributed	37·81 ,,
Increase = 1·81 gms. = 5·03 p.ct.	

It coincided with a very low atmospheric temperature, the effect of which upon the benzol content of gas is separately considered in a later paragraph. By adding together the weight of benzol collected in the course of 2200 tests, it was found that, on the average, the gas lost by traversing the holder only 0·045 gm. of benzol per cb.m. This loss would represent the amount of leakage resulting from the diffusion of the benzol from the water, and its evaporation on the surface of the cups of the gasholder. But such an estimation is rendered uncertain from the fact that the total amount of benzol in the water of the holder may not be the same at the end as at the beginning of the period of the tests. At any rate, it can be said that a holder the water of which remains saturated for a long time affects the mean benzol content of the gas to only a negligible extent.

As soon as gas begins to lose benzol by contact with water in such proportions that several decigrammes are absorbed per litre, the question of testing for the extraction of the benzol arises. This was done in 1885 and in 1889. It would take too long to describe the distilling apparatus, but it can be said that large quantities of water assumed to contain benzol were distilled in the laboratory, two litres at a time. These waters came from meters and from gasholders, whence they were drawn at different depths. The results obtained were very variable:

	Benzol per Litre of Water.
Maximum	0·342 gm.
Minimum	0·130 ,,
Mean	0·231 ,,

The waters taken at great depth did not always contain the most benzol. A case is mentioned of two samples taken in the cup outside the bell of the holder, one at two metres depth and the other at the surface. The results were:

	Benzol per Litre of Water.
At two metres depth	0·267
At the surface	0·024 / 0·000

Again, a water containing 0·291 gm. per litre was exposed to the air; and after 48 hours it contained only 0·066 gm. It is thus seen that benzol retains itself in solution in water only when the water is in permanent contact with the gas—that is to say, it follows the laws of the solubility of gases in liquids.

Tests were made of the solubility of benzol in water condensed in the syphons of the Paris mains. The figure found, over six months, was 0·031 gm. per cb.m. of water. The total loss of benzol from these condensations thus amounts to 1·6th of a milligramme per cb.m. of gas. M. Deville added that estimations of benzol and of carbon dioxide in waters require to be made by weight, and the results translated into volume percentages.

As regards the composition of benzol obtained from water, the distillation of 140 gms. obtained from 5000 to 6000 kilos. of water gave the results shown on the next page.

	P.Ct.
Boiling below 80° C.	12·1
,, from 80° to 84° C. (benzine)	45·6
,, ,, 84° to 100° C.	11·3
,, ,, 100° to 120° C.	9·1
,, above 120° C.	21·9

To these observations on the absorption of benzol by water is added one on the action of rubber on the benzol contained in gas. It was found that passing the gas through 10 metres of newly vulcanized rubber tube weighing 1·7 kilos. caused a loss in the benzol content of the gas from 38·51 to 32·40 gms. equal to 6·11 gms. per cb.m. This is equivalent to a loss of 0·611 gm. per metre of rubber; while in the case of old rubber, the loss amounted to only 0·25 gm. per cb.m. per metre of tubing.

Variations in Periods of Carbonization.

In making measurements of the variation in the benzol content of gas according to the period of carbonization, great difficulties are experienced, as it is necessary to remove the gas for testing without its coming in contact with any tar other than that which is carried along with it. The results obtained require, therefore, to be taken as indications only, without possessing claims to great accuracy. The figures in Table VI. give the production of benzol per tonne of coal distilled in a bench of seven retorts.

Table VI.

Mean of Three Different Coals.	Gas Produced.	Benzol. Per Cb.m	Benzol. Total per Hour.	Benzol. P.ct. of Total per Hour.
	cb.m.	gms.	kilos.	
1st hour of carbonization	75·72	49·12	3·719	36·8
2nd ,, ,, ,,	81·00	44·19	3·579	35·3
3rd ,, ,, ,,	80·16	28·11	2·253	22·2
4th ,, ,, ,,	63·12	9·19	·580	5·7
	300·00		10·131	100·00

In another series of tests, the gas was produced by all of seven retorts of a bench operating regularly under the following conditions: Distillation, four hours per charge of 1000 kilos; charging of the seven retorts being done in a single operation lasting from 25 to 30 minutes. The gas traversed the whole series of condensers and purifiers, and the samples were taken at the inlet of the works meter. Four successive samples were taken during the first, second, third, and fourth hour of carbonization. The figures are the mean of four sets of tests made on four different coals.

	Benzol. Gms. per Cb.m.	Other Hydrocarbons by Volume. Per Cent.
First hour	39·76	7·09
Second ,,	35·33	4·89
Third ,,	42·90	2·38
Fourth ,,	43·74	0·96

The contrast with the results of the first series is striking. It is evident that a quantity of tar lying in the condensing plant absorbs benzol in excess from the gases at the beginning of the charge; and, on the other hand, it gives up benzol to these gases at the end of the charge. The experiment shows with what readiness and speed benzol vapour dissolves in tar or is discharged from it.

Results from Different Coals.

As regards benzol in gas from different coals, the gas produced by carbonization in a seven-retort setting of the old type of the Paris Gas Company under pressure up to the meter and purifiers, and without the addition of air, is the only one employed in the Experimental Works, since it is only under these conditions that comparable tests may be made of coals over long periods. In such a works, the content of benzol was found to vary between 31 and 44 gms. per cb.m. A Bourges coal, of Type I., and containing 26 p.ct. of volatile matter, is the only one which has ever shown a benzol content below the lower limit. Contents greater than 42 gms. are equally rare, and have been met only with Yorkshire coals of Type IV. Generally, the benzol content increases with the oxygen content of the coal; but the benzol of rich gases, or those containing oxygen, is poorer in pure "benzine." Some figures are shown in Table VII.

Table VII.

	Type II.	Types III. & IV.
Benzol per cb.m. of gas	35·83 gms.	38·32 gms.
Proportion of pure benzine in benzol	81·2 p.ct.	70·2 p.ct.

Influence of the Season on Benzol.

The atmospheric temperature has a sharp effect on the benzol content, as shown by the following figures, which represent the principal descriptions of coal:

—	Winter.	Spring and Autumn.	Summer.
Number of tests	166	241	134
Mean temperature of atmosphere	·85° C.	9·02° C.	18·65° C.
Benzol content of gas gms. per cb.m.	36·61	38·07	39·92

Benzol of the winter season is a little richer in pure "benzine" than that of summer. These peculiarities are evidently due to the fact that in summer the equilibrium between the vapour-tension of benzol in the tar and its tension in the gas takes place at a higher temperature. The weight of benzol per 1000 kilos. of coal is obtained by multiplying the benzol content by the yield in gas. During a fairly long period, analyses were made of the benzol in the tars. Generally, the total weight of benzol per tonne of coal varies (according to circumstances) from 10 to 13 kilos. The distribution of the benzol between the gas and the tar varies a little, according to the coals and the seasons. With the same coal, there was 95·19 p.ct. in the gas in winter and 4·81 p.ct. in the tar. In summer, these figures were 96·58 p.ct. in the gas and 3·42 p.ct. in the tar. For a given time of year, a rich coal gave 95·31 p.ct. in the gas, and 4·69 p.ct. in the tar. With a poor coal, the results were: 96·96 in the gas and 3·04 in the tar.

Effects of Carbonization Temperature.

In estimating the influence of the temperature of carbonization on the benzol content, it is found that a somewhat higher temperature gives a gas containing a little less benzol. But the quantity of gas produced is greater; so that, with allowance for this fact, it is found that in the gas produced per tonne of coal there is a little more benzol at a high than at a low temperature. It is, however, possible, and even probable, that in this latter case the tar retains a little less. At any rate, it may be said that, within the narrow limits of temperature variation which occur without deliberate intention, the temperature of the furnace has little influence on the benzol production. It is, of course, otherwise in the distillation of coal in thin layers and in other special ways. In this case, the layer of coke which first forms in contact with the walls of the retort or of the distillation chamber retains a very high temperature for a considerable time, while the centre of the mass of coal is being completely distilled. Thus the gas which is evolved from the centre is subjected to decomposition in passing through the crust of coke which surrounds it. Tests made at the Experimental Works from 1902 to 1906, in which ordinary retorts were fully charged, and in which also specially large retorts (taking 900 kilos. of coal) were used, showed that the loss of benzol under these conditions could be estimated at 7 p.ct.

Conclusion.

In concluding the review of his researches on benzol, M. Deville recalled the prominence given about the year 1880 to the theory of M. Cadel on warm condensation, according to which the gas could be considerably enriched by keeping in it the greater part, if not the whole, of the benzol normally retained by the tar. Tests at the Experimental Works showed the absurdity of these conceptions, and proved that since in current practice only 3 to 4 p.ct. of the total benzol is retained by the tar, there is almost nothing to gain by attempts to enrich the gas further at the expense of the tar. However, since at that time the Paris Company were under very strict supervision as regards illuminating power, and as it was not permissible to enrich the gas with benzol (on the ground that such gas is no longer pure coal gas), it was found desirable to ascertain experimentally the maximum quantity of tar which was able to be condensed without the naphthalene becoming a disturbing factor. It was found that this quantity was 65 p.ct. of the total tar, or about 130 gms. per cb.m. As the hydraulic main already retains approximately 50 p.ct. of the tar, a large collecting chamber was installed next to it, with a capacity of 3·6 cb.m. per seven-retort bench. At the outlet of this apparatus, the gas still containing 35 p.ct. of tar or 70 gms. per cb.m. was cooled as rapidly as possible; and this weight of tar should have sufficed to dissolve and retain in the cold a sufficient quantity of naphthalene vapour. But such an arrangement can function effectively only if the ratio of the capacity of the warm condensing chamber to the gas production remains constant. In the large works of the Paris Gas Company the volume of these warm condensers—namely, 0·8 m.—was in general almost in the proportion suitable to the mean annual production; but it could not be reduced when, in summer, certain benches were put out of operation. It then became excessive; and the naphthalene was no longer retained in sufficient quantity by the tar.

This, in fact, had no result from the point of view of adding to the benzol content of the gas; and it required to be recognized that the work necessary in the transformation of a system of warm condensation chambers was out of proportion to the result to be obtained purely as regards naphthalene. During the early years of the present century, the Paris Gas Company were permitted, more or less officially, to enrich their gas with benzol; and thenceforth they experienced no drawback in the practice of abrupt coal condensation at the outlet of the hydraulic main for the purpose of reducing to a minimum the naphthalene content of the gas. It was for this reason that M. Laurain has recommended as the most rational process that of cooling the gas as quickly and as completely as possible at its outlet from the hydraulic main, and then separating the tar by means of a powerful condenser. The illuminating power suffered to the extent of 1 to 1·5 p.ct.; but this was remedied by enrichment with benzol. At the present day, however, it is with the extraction not the addition of benzol that we have to deal. The attitude of gas makers to the question has undergone a remarkable development during fifty years; but a good method of measuring the benzol content, and one which at the same time allows of the exact composition of the benzol being determined, is still indispensable to the industry.

IRISH GAS MANAGERS' ASSOCIATION.

Annual Meeting in Dublin.

The Annual Meeting of the Irish Association of Gas Managers is being held to-day in the City Hall, Dublin, under the presidency of Mr. H. W. Saville (late of Drogheda, and now Engineer and Secretary to the Wexford Gas Company), whose address appears below.

The programme for the meeting also includes papers on the "Present and Future Position of Small Gas-Works in Ireland," by Mr. T. J. Reid, of Ballina, and on the "Steaming of Horizontal Retorts," by Mr. P. B. Ellacott, of Newry, as well as a debate upon the question of the "Status and Remuneration of Gas Managers." There will be a luncheon, on the invitation of the President; but this year the dinner has been dispensed with.

For to-morrow (Wednesday), an excursion has been arranged to Enniskerry, the Dargle, and Bray.

ADDRESS BY THE PRESIDENT, H. W. SAVILLE, of Wexford.

Gentlemen,—My first duty is to express my thanks for the honour you have conferred upon me in electing me President of the Association, and especially so, in that this year has seen the conclusion of hostilities and the signature of the Peace Terms. The changes of the past five years, from which the gas industry in Ireland has suffered severely, have brought about new conditions. Therefore, in preference to taking up a particular subject for my address, I thought it better to take stock of our position generally; so that we might discuss our future course of action in our endeavours to place our business upon a sound footing.

COAL AND FREIGHT.

My predecessor laid great stress on the question of coal supplies, which we had hoped would have reverted to normal when the war ended, only to see the position get steadily worse in every respect. The southern district generally, being cut off from their former source of supply, have been entirely at the mercy of the Coal Controller, as regards supplies, quality, and price, who is evidently of the opinion that any coal is good enough for gas-making purposes. The freight question is the most flagrant specimen of profiteering at present, either in spite of, or in collusion with, the Government. All efforts by the Association and others to get the Shipping Controller to intervene have proved abortive, as he cannot agree that shippers are making excessive profits. The present gamble in shipping and the glowing prospectus now being issued tell a different story.

EXPERIENCE OF STEAMING HORIZONTALS.

Most of us have been compelled, either through shortage or the excessive price of coal, to experiment in many ways for the purpose of trying to increase the yield of gas per ton of coal, generally by steaming horizontals; but the use of water gas and carburetted hydrogen plants has been largely extended. My own experience of steaming horizontals was not very happy—being tried on old retorts, which worked extremely well until all the carbon had been cleaned off, after which the loss of gas through leaky retorts balanced the increased return from steaming. Arrangements had, however, been made to adapt the Devon process to a new bed.

ILLUMINATING POWER TESTS.

The Board of Trade have extended their protection against persecution from illuminating tests until October; and no doubt this will be further extended during the continued shortage of fuel. It is hoped that in the near future time will be found by the Government to introduce legislation on the lines of the report of the Fuel Research Board. The National Gas Council are watching the interests of the industry in this matter; and I would impress on the members the advisability of linking their undertakings with the Irish Section, in which the smaller works are poorly represented.

HIGH COSTS OF MATERIAL AND LABOUR.

The difficulty of obtaining materials during the war was such that repairs and renewals of plant have been allowed to stand over as far as possible, with the result that a serious problem has arisen through the enormous prices of materials, and the labour charges for erection. Labour in Ireland before 1914 was comparatively cheap, and little advantage was to be gained by labour-saving appliances, except in the largest works. But now when wages and decreased working hours aggregate to three times pre-war costs, the position is completely altered. The cost of the erection of vertical retorts, for instance, is now almost prohibitive, necessitating in many cases an application to Parliament for increased financial powers, with its attendant troubles and expense, which will mean that many who would prefer to take the proper course of scrapping out-of-date plant will find it difficult to persuade their directors or committees to face such an outlay.

METERS.

The increased number of defective meters, which have made matters very difficult at times through delays in transit, &c., leads one to hope that the meter-makers will either bring meters up to present-day requirements, or turn their inventive powers to the production of a more suitable method of measurement.

The low price of tar, through lack of competition, is a hardy annual; but the increased use of this material for road-making purposes, and the introduction of dehydrating plants, will help to relieve the market and increase prices generally, especially so now that the cost of acid and labour is swallowing up the whole of the revenue from sulphate of ammonia.

IRELAND AND PRICE REVISION.

If, and when, the President of the Board of Trade redeems his promise to go into the question of gas prices under Statute, we in Ireland should ask for separate treatment, seeing that, through excessive freights and greater comparative increases in the cost of labour, we have been much harder hit than our friends across the water. My own Company, under the sliding-scale, with a neutral zone of 2s. 7d. to 3s. 4d., are now supplying at 5s. per 1000 c.ft., and are only entitled to pay 5 and 2½ p.ct. dividends. By taking advantage of the Increase of Charges Act, we may pay 3¾ p.ct. on new capital—an absurd figure—thus delaying reconstruction. In a country with a decaying population, the gas industry could formerly show increasing prosperity; but it was only as the result of pushing sales by cookers, fires, and prepayment installations, and working on a small margin of profit on account of the low average consumption. This business has been at a standstill by order; and now, with present costs of appliances and labour, according to my estimate it will necessitate an average consumption of about 40,000 c.ft. per annum to pay interest and depreciation on the outlay involved. We have temporarily arranged to continue the business by supplying cooker and meter only—the customer paying for all fittings, labour, &c.; and we have more orders on these terms than we can cope with. No one can accuse the Government of gratitude in the manner in which they are dealing with gas undertakings—the subsidy to our chief competitor, and the lack of sympathy and assistance in the difficulties arising from circumstances beyond our control, are such as to give great cause for anxiety for the future of the industry.

I think that we should immediately approach the Chief Secretary for an interview on this question, and suggest his introducing legislation for the relief of the gas industry in Ireland, on the following lines. That all statutory standard prices for gas be increased by 50 p.ct., that the balance of unissued capital and borrowing powers be increased by 100 p.ct., with power to issue the latter as redeemable loan at present-day rates of interest.

A number of the smaller works have already been closed down, and the companies wound-up; and, unless we demand relief from the Government (who are largely responsible for our present financial condition), we must be prepared to follow their example, seeing that the receipts on the present basis will not balance expenditure.

SALARIES.

The question of salaries is one that cannot be overlooked; and now that a union is being formed for engineers and managers, it merits all our support, whether we suffer from a sense of grievance or not.

I have tried to bring shortly before you the salient features of the present position, and would be pleased to have the views of members on these subjects, as any helpful suggestion for overcoming the difficulties which confront us will prove the value of our Association.

Gas for the Making of Cheese.

It can scarcely be denied, says Mr. Gilbert C. Shadwell, writing in the "American Gas Engineering Journal," that necessity was the mother of invention of the gas-heated cheese kettle. It is his belief that the first of these appliances made was turned out less than ten years ago; but the success achieved was so great, and the different improvements required in later designs were so minute, that the idea seems to have spread almost nation-wide by this time. His own description of the appliance is that it consists of a copper kettle (usually tinned), and has the appearance of a cross between a water-jacketed cauldron furnace and a clothes boiler. The water-jacket should preferably be of sheet steel of fairly heavy gauge, welded, and galvanized. The one thing, however, that is wanted is a really good article. For making cheese on a small scale, the kettle would be from 20 to 200 gallons capacity. The object of water-jacketting is to obviate the danger of burning the milk. The temperature required is only 82° Fahr.; so that in very hot weather no heat is needed. Later in the process the whey is separated, and the curd cut up in small pieces and heated for about an hour to 90° Fahr. After pressing, the cheese is cured, during which process it is kept for a few weeks in a well-ventilated room at a temperature of about 60° or 70° Fahr. Mr. Shadwell has not seen the use of a gas-fired air-heater for this; but it is his belief that the work can be accomplished very thoroughly by the aid of one, where a large blower is used; and the results ought to be first rate in reducing the time of airing.

At the autumn meeting of the Iron and Steel Institute, which will be held at the Institution of Civil Engineers, on the 18th and 19th prox., there will be a conference on "Fuel Economy," at which Dr. W. A. Bone, Sir Robert Hadfield, and Mr. A. Hutchinson will present, on behalf of the British Association Fuel Economy Committee, a report on fuel economy in steel works, and Mr. H. James Yates one on fuel economy in foundry practice. Messrs. Cosmo Johns and L. Ennis will also contribute a paper on fuel economy in German iron and steel works.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Further Parting of the Ways.

SIR,—If I understand aright your editorial note and the letter inspiring it in the current number of the "JOURNAL," it is impossible to make, in ordinary everyday economic working, water gas having an average composition below 12 p.ct. of inerts. I have been under the impression that water-gas manufacture was a more efficient process than this figure would seem to indicate, whatever may be the case with coal gas. Was I wrong?

CHARLES CARPENTER.

South Metropolitan Gas Company,
709, Old Kent Road, S.E., Aug. 16, 1919.

[No; but there is much underlying the words, "whatever may be the case with coal gas."—ED. G.J.]

Tar Distillation Results at Burnley.

SIR,—Your correspondent "Interested" will find that the receipts stated at £5756 apply to the year's production of 2711 tons, and not to the 3180 tons to which he refers. The figures as given in my report are therefore correct.

JOHN P. LEATHER,
Gas Engineer.

Burnley, Aug. 16, 1919.

Revision of the Sliding-Scale.

SIR,—Dr. Carpenter, in his speech at the half-yearly meeting of the South Metropolitan Gas Company, on the 13th inst., in referring to the application of the sliding-scale, said:

> "Some persons appear to think that the sliding-scale has broken down; but, in my opinion, the principle of the sliding-scale will prove to be more than ever a necessity, as the only solution of the difficulties with which the industry is faced. The present application of the scale is obsolete."

And Mr. Honoratus Lloyd, at the same meeting, in his remarks stated:

> "I, therefore, venture to suggest that while the sliding-scale has been absolutely vindicated, and proved to be thoroughly successful and in the interests of everyone, it is the application of the figures to the sliding-scale which requires modification, and will have to be modified. Parliament has admitted it; everybody knows it. And if I may quote three lines from a speech made by the President of the Board of Trade at a recent meeting, you will see that he admits it, too. He said: 'With regard to the financial points which you have raised, I do not feel myself in a position at the moment to say more than this—that, given what I have said, we recognize fully the importance of the industry, and, clearly, steps must be taken in some direction which will make it possible for the industry to carry on and develop.'"

If we turn back to the history of the sliding-scale, and refer to a letter, dated June 1, 1875, from the Board of Trade to Mr. W. E. Forster, the Chairman of the Select Committee of the House of Commons, we shall find it stated (on behalf of the Government of the day):

> "To make a scheme of a sliding-scale of price and dividend just and effectual, the following conditions appear to be necessary:
>
> (1) That the initial price and quality of gas shall be fairly fixed, having regard both to the immediate existing interests of the companies and consumers, and to the prospects of both under the new system,
>
> (2) That the price and dividend shall vary in certain fixed proportions, without limit....."

There ought to be no difficulty in presenting a case, representative of the whole industry in its relation to a revision of the sliding-scale, as it was undoubtedly recognized in 1876 that any basis of a sliding-scale could only be applicable to the immediate existing interests of the companies and consumers; and, as circumstances have so vastly altered in recent years, it is obvious that the interests of the companies have changed, owing to conditions entirely beyond their control, and not in any way due to lack of efficient management.

R. W. EDWARDS.

Aldershot, Aug. 15, 1919.

The Control of Air and Gas in Heating.

SIR,—I notice in your issue of Aug. 12:

1.—On p. 338, a report of Mr. J. P. Conroy's remarks at the Southern Gas Association of the United States, in which he talks generally of radiant heat and radiant fire, and his surprise that gas engineers have not noticed the loss in radiation from flames, and that radiant heat can be directed, and put where it is wanted—just the same as light.

2.—Immediately underneath this notice may be observed a quotation from one of the publications by the U.S.A. Bureau of Mines: "The control of the air supply is absolutely indispensable to the efficient operation of a furnace." They might have added "to any gas-heating appliance."

3.—On p. 343, in a paper presented by M. Grebel to the Société Technique, he deduces that an average economy in favour of controlling both mixtures is 40 p.ct. But he controls each burner separately, and fixes the pressure of the air at 11·81 in., and that of the gas at 2·36 in. This is a difficult matter to do in large factories, where as many as 300 or 400 burners, or even more, may be in use.

Now, in September, 1917, I read a paper before the Institute of Metals, demonstrating the foregoing claims, and exhibiting practical means by which these effects could be produced, and the gas and air controlled, not for one device only, but for a whole factory or bay of furnaces, and heating apparatus of all descriptions.

Now, Mr. Editor, do you not think that, in common fairness, you would do well to reconsider the remarks made in your "JOURNAL" on the subject of this paper, and to give greater publicity to what has been achieved by "Captive Fire?"

A. C. IONIDES, JUN.

34, *Porchester Terrace, W. 2, Aug. 15, 1919.*

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Progress of Bills.

The Pembroke Gas Bill and the Dover Gas Bill were read the third time, and passed, with amendments.

The Ammanford Gas Bill was read the third time, and passed.

The following Bills received the Royal Assent: Gas and Water Orders Act, Newark Gas Act, Stockton-on-Tees Corporation Act, Stocksbridge Gas Act, Bournemouth Gas and Water Act, Huddersfield Corporation Gas Act, Dover Gas Act, Pembroke District Gas Act, Bedwellty Urban District Council Act.

Unsuitable Coal at Stoke-on-Trent.

Mr. SEDDON asked the President of the Board of Trade whether he was aware that the Stoke-on-Trent Corporation Gas-Works were being compelled to purchase Durham coal, entailing extra strain upon railway transit and at a cost of 8s. per ton more than they were paying for local coal: and, in addition to this extra cost, there is a very high percentage of ash, causing difficulties in clearing the producers, dissatisfaction among coke purchasers and gas consumers, and that the ammoniacal liquor produced from Durham coal is 10 gallons per ton less than is produced from local coal, causing in all an approximate loss of 14s. per ton upon Durham coal. Did he propose to take any action in the matter?

Mr. BRIDGEMAN: Since the coal produced in Staffordshire and other Midland areas is insufficient to meet the demands for local consumption, it has been necessary to bring coal from Durham to meet the deficiency. As far as practicable, the supplies of Durham coal have been equally distributed among the undertakings concerned; and under present circumstances it would not be possible to allow the Stoke-on-Trent Corporation Gas-Works to have more North Staffordshire coal, unless it were diverted from other undertakings.

Colonel WEDGWOOD: Is the hon. gentleman aware that there is coal to meet the supply in the North Staffordshire area; and why should not the Corporation be allowed the opportunity of buying coal near to their own door?

Mr. BRIDGEMAN: I shall be glad if the hon. and gallant gentleman can give any useful information on this matter to the Board of Trade or to the Coal Controller.

Purposes for which Coal is Used.

Colonel BURDON asked the President of the Board of Trade whether he would give, for the year 1918 or the last year available, a table showing, by industries, the estimated subdivision of the use of coal retained for home consumption.

Mr. BRIDGEMAN replied that in the year 1917 the coal available for home consumption, after deducting the amount required for the operation of the coal mines, was estimated to have been distributed among the principal industrial and other uses approximately as follows:

	Million Tons.
Mines (other than coal mines) and quarries	2½
Railways for locomotive purposes	13
Gas-works	18½
Electricity works	7
Blast-furnaces	19½
Other uses in metal industries, including engineering and shipbuilding	30
Textiles	9
Food and drink	3
Chemical and allied trades	5
Paper, printing, and allied trades	2
Building, clay and stone	6½
Miscellaneous industries	3
Domestic, mercantile, &c., uses, including coal used by the Admiralty and 1¼ million tons used for coastwise bunkering	64
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Retail Price of Coke.

Major PRESCOTT asked the President of the Board of Trade on what grounds the Coal Controller had authorized the maximum retail price of coke to be increased to 6s. per ton in addition to coal.

Mr. BRIDGEMAN said the maximum retail price of coke was increased by 6s. per ton because of the price of the coal from which the coke is produced having been increased.

A Deficit at Chelmsford.—The Secretary of the Gas Department reported to the Chelmsford Corporation Gas Committee that the books of the gas undertaking had been balanced for the year ended March 31, and showed a deficiency of £594 after payment of income-tax, interest on purchase money and loans, and payments out of revenue of £1361 in respect of capital expenditure. The year's revenue was £28,644, and the expenditure £24,666. The net profit was £767; but during the year the Corporation repaid to Messrs. Barclay's the sum of £1361 in reduction of the gasholder and compensation loans accounts.

REGISTER OF PATENTS.

Tar-Still.—No. 127,133.

REID, W. J., of Coatbridge, N.B.

No. 10,260; June 21, 1918.

In a tar-still according to this invention the flue plates extend the entire length of the still, and are set in inverted-V fashion—the lower edges of the plates being riveted to splayed channels extending the entire length of the structure, and the forward and rearward edges being riveted to angle irons at the forward and rearward ends of the still. There are two such flues; so that four flue plates are provided. There are three splayed channels, of which the middle channel is riveted to the lower edges of the two middle flue plates, and each other channel is riveted to the lower edge of an outer flue plate and to the lower edge of the still structure, so that when it is necessary to re-rivet them the riveting operations can be effected from the interior of the still.

Generating Gas from Coal Dust or/and the Like. No. 127,933.

CORTHESY, J. H., of Barnsbury, N., and CASTELLI, S. T. S., of Kensington, W.

No. 7710; May 8, 1918.

This invention relates to the generation of gas from coal or like fuel in a pulverulent condition, and wherein the fuel is subjected to a whirling motion. Apparatus of this class has heretofore been proposed for producing gas designed for immediate combustion—either for the treatment of materials mixed with the fuel, or for other heating purposes; a whirling motion of the fuel being produced by means of air jets.

The object of the present invention is to provide apparatus wherein gas can be generated for lighting purposes—consisting mainly in the utilization of a portion of the gas generated for maintaining in motion or suspension the fuel which is to be subjected to the distilling action, without the employment of atmospheric air, the oxygen of which would tend to render the gas unstable.

In one construction for carrying out the invention, generating chambers are arranged for two qualities of gas, by providing a cylindrical case, in the upper part of which is a cone, and around the base of which is an annular opening communicating with a chamber or space below the cone. The fuel is first introduced into the generating (distilling) chamber, above the cone, where it is subjected to the vortex action of a current of a portion of the gas just previously generated in the chamber and distilled therein; the coke or residue of the distillation then passing into the lower chamber, where it is acted upon by an air current, which again imparts motion to it, and wherein gas of a different nature is produced. Steam may be introduced into this lower chamber, so that water gas is generated—the gas passing up through the interior of the cone, and being led off to any point for consumption, and during its passage heating the upper chamber and superheating the gas current above referred to. Such a degree of superheat may be imparted to the gas current in the distilling chamber as will enable complete distillation of the fuel introduced into it to be effected without the employment of the lower chamber.

Blow-Pipe Burners.—No. 127,999.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 9726; June 13, 1918.

This invention, relating to blow-pipe burners for use with high-pressure gas, has for its primary object to provide a construction adapted to produce a high velocity flame of high temperature which is not liable to blow off or break out into a brush-like formation, "whereby there may be obtained from the tip of the flame an intense local heating effect which is very useful for small brazing work." Provision is made for preheating the pure gas—that is, the gas before its admixture with atmospheric air—by means of a bunsen flame or flames fed from the same gas supply.

Gas Cooking Apparatus.—No. 128,766.

MOUNTAIN, H., of High Holborn, W.C., and WORSFOLD, J., of East Dulwich, S.E.

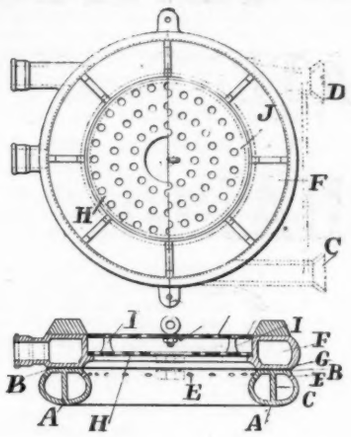
No. 11,308; July 18, 1918.

This is a development of patent No. 12,676 of 1915, which described a gas-burner provided in the form of a ring, U-shaped in cross-section, having a dividing plate in the centre, and arranged coincident with a circulator or water heater, and a perforated plate. But it has been found that, by the addition now to be described, "the efficiency of the combined gas cooking and boiling burner has been vastly increased, the cost of production reduced, and the work of assembling the apparatus facilitated."

As shown, the burner portion A of the combination is made with a horizontal closed top B, having the dividing plate C cast as an integral portion. Inlet pipes D are provided for the admission of the combustible mixture, and holes E around the internal and external peripheries of the burner ring just below the flat top form orifices for the combustible mixture. The inlet pipes are arranged so that one supplies the combustible mixture to the inside ring, and the other to the outside ring of holes; and a connecting bar is cast on them for the purpose of securing them to the stove.

The circulator or water heater F is similar to that provided in the earlier patent, except that it is constructed with a flat bottom G, instead of the rebated edges and a slot for the dividing plate; and it is provided with flange connections for the circulating pipes, instead of screwed sockets.

In the patent of 1915 a grilling plate H is described; but in order to obtain greater efficiency, it is proposed to construct a duplex grilling plate in the following manner: A, having a large opening in the centre, is surrounded by smaller perforations to form the bottom or grilling plate. Secured to this plate by distance pieces I is another plate J, constructed with a solid part in the centre, and a lifting ring with small perforations or holes surrounding it. When these plates



Mountain and Worsfold's Gas-Cooking Apparatus.

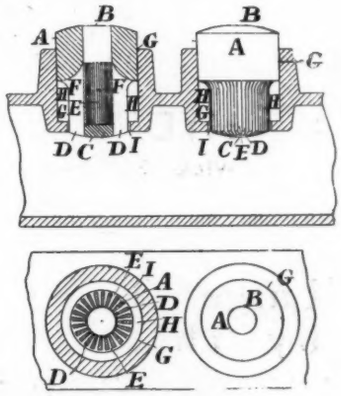
are in position inside the water ring F, the points of the ignited combustible mixture from the inner ring of the gas-burner, in converging and passing through the opening in H, strike against the solid part in J, and spread themselves out in a space between the plates, and the heat is concentrated upon the lower plate and also directed to the inner walls of the water circulator.

Atmospheric Gas-Burners.—No. 129,473.

YATES, H. JAMES, M. HOWLETT & CO., LTD., and DOLPHIN, J., all of Birmingham.

No. 12,038; July 24, 1918.

This invention, referring to burners for gas-fires, has for its object "to provide simple and efficient means for preventing flame noises at the nozzle." For the purpose, each of the outlets of the burner is provided with a refractory nozzle (open at the top and partly closed at the bottom), furnished at its lower part with a number of vertical longitudinal ribs alternating with narrow gas-inlet slits between them, which are open at the periphery and at the bottom of the nozzle around the closed central portion. The lower perforated portion of the nozzle is made of smaller diameter than the upper portion; and the body of the burner is made so as to form an annular space round the lower perforated portion, and preferably with a bottom contracted portion of nearly the same diameter as the perforated portion of the nozzle, so as to increase the speed of the gases rushing up the narrow slits round the central portion, and thus prevent any dust resting on the latter.



Yates, Howlett, and Dolphin's Atmospheric Gas-Burner.

A sectional elevation of a portion of the burner is given, with two of the improved nozzles fitted therein (one shown in section); also a part sectional plan.

The nozzle A is made of steatite, of cylindrical shape open at the top B and partly closed at the bottom end C. It is of uniform internal diameter, and has at its lower part a number of vertical longitudinal ribs or bars D alternating with narrow inlet spaces or slits E between them, forming passages for the gaseous mixture from the exterior to the interior. The bottom ends of the slits open out at the bottom of the nozzle around the solid central portion, and the upper ends incline upwardly at F towards the interior of the nozzle. The upper part of the nozzle is preferably very slightly coned downwardly, so as to fit properly and for the proper depth in the circular hole G in the burner body, thus leaving an annular space round the lower ribbed portion of the nozzle, which is of smaller diameter than the upper portion. The

lower portion of the hole is reduced at H, so that the bottom hole I is but slightly larger than the lower portion of the nozzle A. Thus currents of gaseous mixture passing up the narrow slits E will be intensified in speed, and dust will be prevented from resting on the central bottom part of the nozzle, as it is blown away by the currents of gaseous mixture entering the lower ends of the slits. Some of the gaseous mixture also passes up the small annular space formed by the hole I round the lower part of the nozzle, and enters the slits from the annular space H. Thus the gaseous mixture entering the nozzle A from the burner body is by the narrow slits E broken up (as aforesaid) "with the result that the usual roaring flame noise is prevented or reduced to a minimum."

Gas Lighting System.—No. 129,491.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 13,001; Aug. 10, 1918.

This gas-lighting system is applicable, for example, to railway carriages and other fast-moving vehicles, of the type in which a single injector is utilized to introduce a self-burning mixture to a number of lamps.

According to previous practice, the injector has usually been arranged at one end of the railway carriage; but it is found that, although with the train at rest the static conditions at the inlet to the injector and the outlets of the burners may be substantially the same, when the train is moving rapidly there is a material difference between the static conditions at these points. For example, the pressure inside the lamps may be either above or below zero, and the pressure conditions at the inlet to the injector may also vary within an appreciable range. If different effects are produced on the pressure conditions at these points, due to the motion of the train, the quality of the mixture admitted to the lamps is seriously affected.

In the system according to the invention the injector is fitted inside the casing of one of the lamps—preferably the central lamp of the group—so that the wind, &c., will affect equally the pressure conditions at the inlet to the injector and the outlet of the burner of the lamp. Inasmuch as normally the wind-effect on all the lamps is the same, it follows that, with the inlet of the injector and the outlets of the burners equally affected, "the drawbacks incident to previous practice are obviated."

In practice, the outlet of the injector may be connected into the main pipe supplying the various lamps, and provision is made for adjustment of the mixture from inside the compartment equipped with the lamp to which the injector is fitted, so that the effect of adjustment can be marked on observation of the burner of the lamp in question.

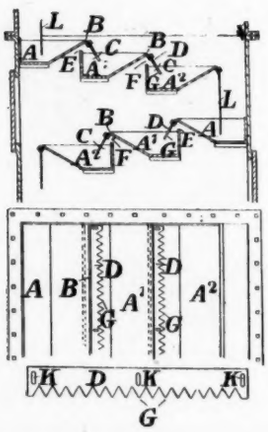
Distillation of Ammoniacal Liquors.—No. 129,765.

WYLD, W., of Menston, near Leeds.

No. 10,162; Dec. 18, 1918.

This apparatus comprises a series of superposed receptacles, each with a lip or depending flange which dips into the liquid contained in another receptacle, so that the liquid flows over the lip and the heating medium flows through the liquid under the lip. In this type of apparatus it has been proposed to make provision whereby the degree of immersion of the lip or depending flange may be varied, by tilting the entire receptacle from which the lip depends. According to the present invention, the lip or depending flange can be adjusted to vary the degree of its immersion without deranging the receptacle, and therefore without altering its effective capacity.

A part-sectional elevation showing one form of the apparatus is given; also a sectional plan and a detail.



Wyld's Ammoniacal Liquor Distilling Plant.

A series of troughs A, A¹, A¹¹ are adapted to extend in parallel formation across the interior of a tower—each with a depending lip or flange D at one side, adapted to overlap the side E of an adjacent trough. The side of the trough thus overlapped is slightly higher than the other side B at which the depending lip is provided. Between the lipped part of the trough and the edge which it overlaps, is a space F through which steam may pass at C below the depending lip, which is immersed in the liquid. The formation of the troughs is such that the steam entering the liquid is injected laterally of the trough so that it displaces any solid matter and carries it along with the liquid through the apparatus.

L represents the modified lip which at one side of the apparatus depends from the trough A¹¹ into the first trough A of the compartment below. The elongated surfaces through which the heating media egresses are adjustable so as to depend into the liquid in the various receptacles at various depths according to the volume of the heating media passing from compartment to compartment. For this purpose the depending lip portions D of the troughs (where serrated, as at G) are formed separately and adjustably attached. The apertures have closure members H provided in the wall of the tower between each compartment to permit of inspection and cleaning.

Manufacture of Sulphate of Ammonia.—No. 129,850.

OAKBANK OIL COMPANY, LTD., and WISHART, J., of Glasgow.

No. 13,842; Aug. 26, 1918.

The patentees say in their specification: One of the difficulties heretofore experienced has been that the sulphate of ammonia put on the market has contained a quantity of free sulphuric acid, and "it is a matter of importance that it should be in an almost neutral condition." Heretofore it has been proposed to pass ammonia gas through commercial ammonium sulphate to render it neutral; and it has also been proposed in processes of obtaining ammonium sulphate in neutral condition to subject the crystallized acidulated sulphate in the washing treatment to the action of a saturated neutral or slightly ammoniacal solution of ammonium sulphate until the solution leaving the crystallized sulphate shows no acidity.

According to their improvements in the process of eliminating the mother liquid from the salt by centrifugal or equivalent apparatus, at a certain stage of the process—that is, when starting or immediately before employing the centrifugal apparatus—they introduce a measured quantity of ammonia liquor into the pan containing the salt, and the centrifugal or equivalent apparatus carries the ammonia through the salt, and in this way neutralizes the excess acid.

The ammonia liquor used contains ammonium carbonate in addition to the ammonia, since it is obtained direct from the crude ammonia still.

In practice, they have found that the strength of the ammonia solution required to neutralize the free acid in the sulphate of ammonia produced is most suitable when it contains 5 to 7 p.ct. of ammonia in the ammonia and ammonium carbonate mixture obtained from the crude ammonia still. The quantity of the solution required depends on the amount of free acid in the salt, which is usually between 0·14 and 0·2 p.ct., and must be practically neutralized.

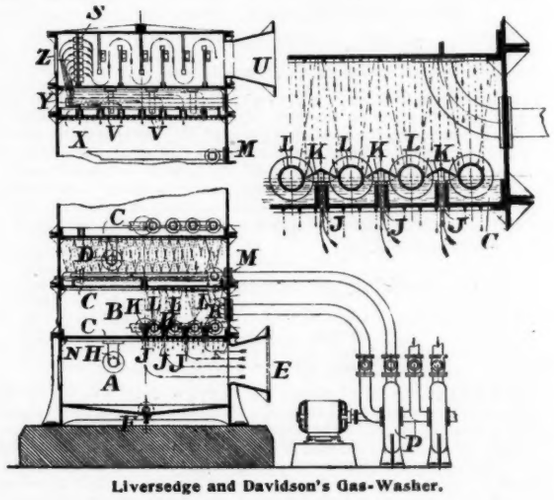
Gas-Washers.—No. 129,829.

LIVERSEDGE, A. J., of Essex Street, Strand, W.C., and DAVIDSON, W. B., of Huddersfield.

No. 12,334; July 29, 1918.

The object of this invention is to provide a washer which does not depend upon any internal moving parts. It consists broadly in arranging a pump for continuously spraying and circulating the washing liquid, and means whereby the liquid delivered shall pass back to the suction or inlet side of the pump, together with fresh washing liquid if or when desirable or necessary.

Fig. 1 is a part sectional elevation of a complete washer. Fig. 2 is an enlarged view of a portion of a chamber, with water-injection pipes, tray, and gas spreaders.



Liversedge and Davidson's Gas-Washer.

A (the base of the washer) constitutes a container for stray liquor; while E is the gas inlet, and F the outlet by which the liquor is removed. A manhole is provided at G; while glass gauge cocks fitted to the chamber indicate the quantity of liquor contained in it. B is the first gas-washing chamber; and any number of such chambers may be superimposed one upon the other. The bottom of the chamber B is formed by the tray C which rests upon flanges which run all round the base so that a sufficiently gas-tight joint may be formed by the tray simply resting on the flanges. Each tray is perforated with a number of slot-like openings J, through which the gas must pass. K are deflectors fitted over the slots, by which the gas is deflected and broken-up in passing the openings. These parts are shown in greater detail in fig. 2. The top of the chamber B is formed by another tray C placed with its slot openings at right angles to those in the tray below. L are water circulating pipes formed in groups and connected

with the chambers as indicated at M. These pipes lie more or less in the tray C between the slot openings, and are perforated at their upper surfaces.

At X is shown the top washing chamber of the series with (at M) the washing liquor inlet. The top of this chamber is formed by a tray C, which constitutes the bottom of the washing liquor feed chamber Y. The final chamber Z is a separating chamber in which the gas is given time to throw down any liquor it may tend to carry away with it—the deposition being assisted by compelling the gas to pass through a number of comparatively small short tubes S, and to follow a sinuous course by means of the baffle plates. Any liquor thus recovered from the gas returns to the feed chamber by the pipes V. The gas finally leaves the washer at U.

In operation the gas passes upwards as indicated by the arrows. The washing liquor fills up the top tray until its flows over the lips of the slot openings in the tray, and falls into the tray of the chamber X—subsequently descending as more liquor or water is fed in through the series of trays until it reaches the base A. Thus the trays become filled in succession until all are full to the lips of the slot openings. In this condition connection is opened between each tray, and a pump P is started to work. Sufficient pressure may be exerted by the pump to throw the washing liquor with such violence against the top of the chamber that the liquor rebounds from that top in the form of fine spray; and with a view to assisting in the breaking-up of the liquor, there may be formed on the underside of each tray a number of studs, from each of which drops of washing liquor will continuously descend. In this way each chamber will be more or less filled with a shower of fine drops and entirely filled with mist or spray—ensuring intimate contact between the gas and the washing liquor.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Aug. 13.]

Nos. 19,193 to 19,657.

BLUM, H.—"Meters." No. 19,416.
CHENARD, E. A. R.—"Apparatus for fractional distillation." No. 19,318.
DOCKING, A.—"Gas-heated vessels or ovens." No. 19,619.
EDWARDS, H.—"Method of extracting oil from shale coal, &c." No. 19,650.
GEORGE, W.—"Non-flow device for pipes, valves, taps, &c." No. 19,405.
GULLIVER, G. W.—"Continuous still for evaporation or distillation and fractionization of liquids." No. 19,543.
HAIGH, J. H.—"Swivel or rotating gas joint." No. 19,232.
IMRAY, O.—"Dry-pipe valves." No. 19,501.
LARKIN, F. S.—"Hot-plates and burners for gas-cookers, &c." No. 19,235.
MACLAY, J. A.—"Fuel for gas-fires." No. 19,527.
MEADOWCROFT, J. C.—"Dry-pipe valves." No. 19,501.
MILLARD, G.—"Falling gas-mantle protector." No. 19,554.
MORLEY, G. A.—See Millard. No. 19,554.
RODHE, O.—"Gas-analyzing apparatus." No. 19,518.
RÜTGERSWERKE AKT.-GES.—"Treatment of coal to obtain bituminous constituents." No. 19,574.
SHARP & PRESTON.—See Docking. No. 19,619.
STEPHENS, A. J.—"Gas toasters." No. 19,433.
STOKES, J. W. B.—"Coal-gas-producing plant for motor-vehicles." No. 19,213.
SVENSKA AKTIEBOLAGET MONO.—"Gas-analyzing apparatus." No. 19,518.
TURNER, C. E. G.—"Doors of fixed overhead bunkers for charging coal, &c., into travelling hoppers, and means for operating said doors." No. 19,520.
WALDIE, C. J.—See Stokes. No. 19,213.
WELLINGTON GAS COMPANY.—See Stephens. No. 19,433.
WELLS, J.—"Tar extractors and scrubbers for gas." No. 19,478.
WHITE, F. W.—"Gas turbine." No. 19,590.
WILKINSON, G. E. G.—"Carburettors and induction pipes for gas-engines." No. 19,228.
WYNNE, J. S.—"Manufacture of ammonium sulphate." No. 19,282.

Uniform Street Lighting Procedure.

The London Safety First Council have adopted a report in which the Street Lighting Sub-Committee, in view of the relaxation of lighting restrictions and the opportunity now presented for effecting modifications in street lighting, emphasize the importance of uniform procedure in the various districts in the Greater London area. They suggest that for the present such uniformity of procedure is best effected by general compliance with the terms of the Standard Specification on Street Lighting presented by the Joint Committee representing the Illuminating Engineering Society, the Institutions of Gas and Electrical Engineers, and the Institution of County and Municipal Engineers. They accordingly recommend that in each district a survey should be made with a view to determining the classification of streets in order of importance, in accordance with the specification, and to ascertaining whether the minimum illumination provided now and after the carrying out of the proposed post-war alterations in street lighting is equal to that which the specification demands. It is also strongly recommended that in conducting this survey, and in making the necessary alterations in lighting, local authorities should especially ensure that there are no sudden transitions from brightness to relative darkness, either in passing from a side street to a busy main street or *vice versâ*, or in passing the boundary in one and the same main street between two districts. In any case in which a discrepancy from the requisite illumination in a street of given class is noted, or there is an indication of an undue contrast in brightness of the kind referred to, the Street Lighting Sub-Committee would be glad to co-operate with any borough surveyor associated with the Council in regard to the alterations necessary to obtain the desired improvements.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of Proprietors was held last Wednesday, at the Cannon Street Hotel, E.C.—Dr. CHARLES CARPENTER in the chair.

The SECRETARY (Mr. F. M'Leod) read the notice convening the meeting, and the minutes of the last ordinary and extraordinary general meetings. The common seal of the Company was affixed to the Register of Proprietors.

DR. CARPENTER'S SPEECH.

The CHAIRMAN: I assume, ladies and gentlemen, you will, as usual, take the report and accounts as read. ["Hear, hear."] I am sure no impartial person will consider the position set out in the first paragraph of the report as a satisfactory one for an undertaking to be in which has for many years supplied a great public want, and has in that period earned the confidence of those who buy from it, those who work for it, and those who control it. For close upon thirty years, the supply of gas in South London has been unimperilled by any suggestion of a strike among the Company's employees. During this period, the Company has worked unceasingly to provide the public with a better article and improved facilities for its use; and it has divided among its shareholders profits which deserve no other appellation than as being moderate. Yet it finds itself to-day entitled to no more recompense for fulfilling, during the last five years, a duty which deserves to be described as national rather than local, than is provided by a dividend of 1½ p.ct., less income-tax, for the half year. During the war we bore this unfair disability ungrudgingly. Parliament, it is true, did recognize the hardships which we, in common with other gas undertakings, were suffering under when it passed last session the Statutory Undertakings (Temporary Increase of Charges) Act. By this measure, we were allowed to declare a maximum of six-elevenths of our pre-war dividend. It is perfectly certain that in thus restricting the extent of the relief given, the Committee of Parliament were influenced by the belief that the expedient was merely a temporary one to enable the companies to "carry on" for the time being. It certainly never realized what is becoming increasingly clear to most of us now—that the present prices of money, labour, and materials are likely to be maintained for long into the future, and that the conditions require re-adjusting in accordance with the altered circumstances. The irony of the matter is that I am not here to-day to apologize for, or explain, an unsatisfactory business. I quite agree that the dividend would be properly thus described.

ADMIRABLE RESPONSE OF BUSINESS.

But the business itself has responded admirably to the changes it has had to face. The public is certainly not losing its faith in gas; for, as the report tells you, our sales are only down by less than 2½ p.ct. compared with the pre-war period, despite the drastic regulations provided by the Fuel and Lighting Order, and the fact that gas has doubled in price. So far from the public giving up the use of gas, there probably never was a time when its many conveniences were so greatly appreciated; and even if the Government place no restriction upon the burning of raw coal, its permanently increased cost will force the public to place increasing dependence upon its gas supply. In short, ladies and gentlemen, we have a very valuable business, which is yielding a very poor return upon the money invested in it, but not because the consumer is unable or unwilling to pay. If any gas stockholder desires independent testimony of the national need of gas undertakings and their *rôle* in conserving the nation's fuel resources, I would recommend him to obtain the report made by Sir Dugald Clerk, Prof. Smithells, and Prof. Cobb. None of these three gentlemen will be accused of being anything but an impartial observer. They have examined and discussed the whole question from an impartial standpoint; and their conclusion supports the view which for many years past has been expressed from this chair.

THE SLIDING-SCALE.

Some persons appear to think the sliding-scale has broken down; but in my opinion the principle of the sliding-scale will prove to be more than ever a necessity as the only solution of the difficulties with which the industry is faced. The present application of the scale is obsolete. The figures given in the report are in themselves sufficient to prove this. The basis of the sliding-scale when it was formulated was to encourage good business management, and not to penalize the investor in gas shares by singling him out for different treatment from that accorded to every other industry. But there should be no difficulty in devising an altered scale to meet the new conditions now confronting us.

RESTRICTING THE OVERSEAS CHEMICAL TRADE.

If temporary hardships due to pre-war sliding-scales were inevitable—and I think they were—an extension of the hardships under which we are working, by restricting our overseas chemical trade, is surely unjustifiable. Of our bye-products other than coke, ammonia was, before the war, the most valuable; and we exported nearly all we produced. Some years before the war, we were aware that Germany was producing in increasing quantities an artificial product of the highest quality; and we realized that to compete we should have to work up to an equally high standard. We have spent much time and money in achieving this, and looked forward to the cessation of hostilities to commence again our valuable export trade. But one of the many Governmental controls—necessary during the war, but so loth to take the opportunity peace provides of returning to their pre-war callings—declined to issue to us export licences, unless we would join a pool, and do the business through its machinery. But for the surprises of the war, this would seem an incredible attitude to be adopted by a Department of the Government which certainly has no mandate to encourage Trusts. I think they are very dangerous weapons for Government officials to play with, and that, whatever restrictions may

be necessary as to imports, the sooner restrictions with regard to exports are removed from goods manufactured in Great Britain and not required by her inhabitants, the better it will be for her and her industries. You will observe from the balance-sheet that our stock of chemical products stands at nearly a quarter-of-a-million pounds. It would be much better realized and in the country's coffers. I ought to add that dealings in other ammonia compounds than the particular one in which we are so greatly interested, though their basic value is the same, are entirely unrestricted. The basic product is ammonia; and on to that are attached acids of different kinds. Sulphuric acid attached to ammonia is controlled in this way; but those who make other compounds have free export. It would be perfectly easy to give to every producer of ammonia an export licence for (whatever the amount may be) the difference between what is required in the country and what is exported. It could be done in a perfectly easy manner by a clerk; but the matter is in the hands of a Department which does not encourage reversion to a pre-war state of things.

THE "BEILBY" REPORT.

I now come to the most important matter with which I have to deal this afternoon—namely, the report made at the instance of the Board of Trade by the Department of Scientific and Industrial Research which is known as the "Beilby" report. It is only within the last few years that a test for heat value has been substituted for one of light value in the statutory regulations of gas undertakings. But the new standard had the same defects as the old—which, by the bye, Livesey tried unsuccessfully to induce Parliament to rectify—inasmuch as a rigid figure of heating value was applied to each undertaking. The heating value of coal gas is ascertained by measuring the quantity of gas required to be consumed in order to raise a definite quantity of water by a definite degree of heat. It is quite an easy thing to remember. It is the measure of gas required to be burnt to make a certain quantity of water hot. The heat required to raise 1 lb. of water by 1° on the Fahrenheit thermometer is the British thermal unit, and is so called. Suppose 1 c.ft. of gas when burnt is found to raise 55 lbs. of water by 10° Fahr., that sample of gas would be described as having a calorific or heating value of 550 B.Th.U. Now, the calorific value of gases varies very considerably. A cubic foot of American natural gas has a value of nearly 1000 B.Th.U.; whereas the hydrogen used for filling balloons has a value of about one-third of this. You would assume from this that, to perform the same amount of work, you would have to employ three times the quantity of hydrogen compared with natural gas, and that if you were charged at so much per hundred heat units, it would not matter to you if the Company supplied these in the form of rich gas or poor gas. This is the underlying principle of the "Beilby" report. It recommends giving freedom to gas undertakings to supply whatever heating quality of gas they can most economically manufacture, always provided that they charge on the basis of its heat energy instead of its volume. I have already pointed out that the British thermal unit is the heat energy required to increase the temperature of 1 lb. of water by 1° Fahr. The value of such a unit would, at the present price of our gas, be about 0·0009 of a penny—much too small a figure for practical use. We therefore propose to take 100,000 of such units, and speak of the group as a "great" or "large" unit. This larger unit would be the amount of heat required to raise 100 gallons of water 100° Fahr.; and at the present price of gas its cost would be about 9¾d., which is quite an easily handled figure. The proposal lends itself admirably to the present system of charging for gas and fittings hire by the medium of the slot-meter—a very important matter, as the users of these appliances form the bulk of our customers.

THE QUESTION OF INERTS.

The next proposal of the report is that the gas should not be loaded with an unnecessary amount of "inerts" or diluents. The limit suggested is 12 p ct.; and in London, at any rate, there should be no difficulty in keeping within this when the coal supply is adequate. The next proposal is that the gas undertakings should be charged with the responsibility of the adjustment of consumers' appliances to the quality of the gas supplied. This reform is a sorely needed one in some instances, and cannot but be in the best interests of the suppliers, as well as users. The suggestion will not come as a surprise to our shareholders. It has been our practice for years past; and some of the strength which the Company possesses to-day is due to the enlightened policy that the Board, at the instance of its officials, have long adopted. The final proposals of the report may be summed-up in the statement that the gas should be purified to the highest practicable degree, and that it should be supplied at pressures adequate to give the consumer the convenience he requires and pays for. We have the fullest sympathy with these two proposals. The last-named is obvious; the first will be equally so when it is remembered that a very large proportion of the gas supplied is consumed domestically. There is no doubt that the inability in the past to achieve a high degree of purity in the gas has acted as a handicap upon its use. We are now, I am glad to say, free from that long existing difficulty; and I anticipate a new lease of life for our principal commodity by reason of the change. We propose to adopt the same procedure with regard to the "Beilby" report as we did, following the lead of the Commercial Company, in 1875 in the case of the "Forster" report. The sliding-scale it recommended was adopted in a Bill we promoted the following session. Experience has taught us that the great object of the "Forster" sliding-scale would have been more completely achieved had its basis been a variable one dependent upon the price of coal. Such a modification affords the most promising possibilities of utilizing to the highest degree our coal resources by those best equipped for the purpose—namely, the gas undertakings of the kingdom.

COAL.

Lastly, I must say just a word about coal. Whatever conditions may be applicable to that wrong-handled industry, I sincerely hope we shall hear no more about its nationalization. [Cheers.] Mining rights might, however, well be transferred to the State, and leased by it to statutory undertakings, such as we are, formed for the purpose of exploiting the principal fields. The mine workers, both above and below ground, should be co-partners with capitalists in the respective undertakings, and with them should have a voice in the management. These proposals are not new to you. I have several times advocated them from this chair—and particularly five years ago, when we had but just embarked upon that stupendous enterprise, our share in the world war. It is a curious example of the unwisdom of political prophecy, to remember that the ruin of the coal industry was declared to be inevitable when a tax of 1s. per ton was levied by the late Lord Salisbury's Government upon coal sent abroad, in order to provide money for the navy. I hope the day has gone, never to return, when we exported our best coal at the same price as that charged to users at home, We are faced to-day with a still further extension of the coal difficulty, in the announcement recently made of an increase of 6s. per ton in the price. We hear a great deal about profiteering; and I hope our friends the Press will, with their usual impartiality, when the time comes to raise the price of gas—and I fear by next Christmas it will be raised to 5s. per 1000 c.ft.—not brand us with profiteering. I am sure they will remember what I have said, that we are getting six-elevenths of a very moderate pre-war dividend.

LOYALTY OF THE EMPLOYEES.

Before I sit down I must say a word about our employees. During all the trying times through which we have been, and are, passing, our employees have never wavered in their loyalty. ["Hear, hear."] Those who have been fighting our battles are now rapidly returning, and taking up the positions filled in their absence by the women volunteers who have done such excellent work for us, and whose loss, I am bound to say, I greatly regret. Not a few of those who have come back show symptoms of chest trouble; and for their benefit and others in our employ we have taken a suitable property at Mundesley-on-Sea, which is being rapidly converted into a convalescent home. I am sure the experiment will turn out to be, not only a humanitarian success, but a financial one, since it will help us to maintain a higher standard of health, and therefore of efficiency, among those who have served the country's interests as well as their own. The idea has met with the warm approval of our employees. I have to move that the report and accounts now presented be received and adopted, and the report entered on the minutes.

Mr. F. H. JONES (the Deputy-Chairman): I beg to second the resolution.

In reply to questions, the CHAIRMAN said:

These last years we were at war, and we could not execute a great amount of important and necessary repairs. This year we are not at war; and we are making up the leeway from which we have been suffering, therefore our expenditure is much higher than in the corresponding period. There is also the fact that both labour and materials did not reach their maximum last year; and I cannot say whether they have this. All I do know is that they are considerably higher. Our business is a fluctuating one—heavy in the winter, lighter in the summer; and the consequence is the outstanding amounts due to us on June 30 are nothing like as much as they were on Dec. 31. I would also point out that the position in which the shareholders find themselves, of holding stock worth less than was paid for it, arises from circumstances over which we, as a Company and a Board of Directors, have no control whatever. These circumstances are shared by every other similar undertaking throughout the length and the breadth of the land.

The resolution was then put and carried unanimously.

THE DIVIDENDS.

The CHAIRMAN: I have now to move: "That dividends, as follows, for the half year ended June 30 last be now declared—viz., on the 5 p.ct. redeemable preference stock at the rate of £5 p.ct. per annum, and on the ordinary stock at the rate of £3 p.ct. per annum; and that the warrants be transmitted to the registered addresses of the proprietors by post." I will ask Mr. Honoratus Lloyd to second the motion.

Mr. E. HONORATUS LLOYD, K.C., Ladies and Gentlemen: I am asked to second the resolution; and I do so, although six months ago I was, and I still am, somewhat devoid of enthusiasm, because the dividend is only 3 p.ct. And it is because the dividend is only at the rate of 3 p.ct. that the gentleman who addressed us found the capital value of his stock so comparatively low. The value of the stock is so many years' purchase of the dividend received. Consequently, if for any reason over which we have no control, your dividend is low, it follows that the capital value of the stock is equally low. We are looking forward to the good times coming again when the dividend will be higher, when, of course, the capital value will recover. It is not the want of business which keeps the dividend down; it is not the want of gas by consumers; and it is not the want of means of supplying gas to consumers—they want it and they will get what they want. We make what satisfies them. But the Government say we shall not pay more than a certain rate of dividend. It is that which limits the dividend, and which keeps down the capital value of the stock. It is not a question of condemning the sliding-scale, as the sliding-scale is, for the moment, practically inoperative. Parliament has passed an Act which gives temporary relief from the operation of the sliding-scale, and Parliament has recognized that the conditions have so changed since the sliding-scale was applied that the time has now come when fresh conditions must be prescribed. I hesitate in speaking to an audience such as this—an audience which is largely interested in gas matters, and has great knowledge of the subject—in referring to the sliding-scale; but the more I move about the country the more ignorant I find the public as to what is the sliding-scale. It was only the other day a gentleman occupying a very high position spoke as if we were profiteering; and I ventured to remind him of the sliding-scale. I informed him that the higher the price charged for gas, the lower was the dividend. He looked at me and said, "Do you mind saying that again." I replied: "The higher the price charged, the lower is the dividend." He said: "You are under some mistake; you must have misread your own Act of Parliament." [Laughter.] You may laugh, but I can assure you that outside this hall if you were to go up to many of the men you meet in Cannon Street they would tell you the same thing. They think because gas is becoming more and

more costly that we, as shareholders, are putting more into our pockets; whereas the fact is that the higher the price charged for gas the lower is our dividend. ["Hear, hear."] The sliding-scale was applied to conditions known at the time; and the object of the standard was surely to provide that the standard price should enable you to pay working expenses and administration charges, and give a fair return on the capital invested. When our standard was fixed at 3s. 1d., it enabled these conditions to be fulfilled; and it was a fair standard. But what is the position to-day?—a position mind you over which we have no control whatever. Coal costs us to-day 16·3d. per 1000 c.ft. of gas sold; wages cost 24·7d., and salaries 2·37d. Adding these figures together, we get 43·37d., or nearly 3s. 7½d. per 1000 c.ft.. Our standard price is 3s. 1d.; but the three items come to 3s. 7½d. So our standard will not allow us to pay working expenses, let alone anything for dividend. The figures as applied to the sliding-scale have become also inapplicable to-day. We demonstrated that to Parliament last year, and they admitted it, because they passed the Statutory Charges Act, which provided that the sliding-scale should be inoperative for the time being, and that we might pay a 3 p.ct. dividend. With reference to the temporary relief given by Parliament, it first of all absolutely admitted that the conditions had so changed that the figures applicable to the sliding-scale were no longer right. But, unfortunately, all that was done was to give a temporary (though inadequate) relief. That it is temporary I need not discuss; that it is inadequate is equally obvious, because when the Government wants to raise money, it offers many advantages which no gas company can offer. It offers a security that no gas company can offer; and it offers 5 p.ct. interest. The Government realizes it cannot raise money at less than 5 p.ct. Is it sound finance for gas companies to try to raise money at 3 p.ct.? I suggest that while the sliding-scale has been vindicated and proved to be in everybody's interest, it is the application of the figure to the sliding-scale which requires modification, and which will assuredly have to be modified. Parliament knows this, and the President of the Board of Trade admits it, for he said recently: "With regard to the financial points you have raised, I do not feel myself in a position to say more than this, that given, what I have said, we recognize fully the importance of the industry, and clearly steps must be taken in some direction which will make it possible for the industry to carry on and develop." But it is impossible to "carry on and develop" an industry such as this is, if you are limited to a 3 p.ct. dividend. The moment we get a fair sliding-scale, and are free from 3 p.ct., the market speaks for itself, and the capital value comes back automatically. We are under the grave disability of having to pay a higher price for coal; and may I utter the pious hope expressed by the Chairman, that none of us may live to see the nationalization of coal. [Applause.] What we want to see is that everybody who has an interest in coal gets a fair share of the profit. The capitalist should have a fair return for his money, and the hewer a fair return for his labour. But this can only be done by having a system which results in each man having an interest in his work. I can only wish that those who sat on the Coal Commission had visited us at the works and seen the harmonious way in which capitalists, as represented by the Board, and labour worked together. The men's representatives have every opportunity of seeing every account. They are able to go through every receipt, and to take part in signing cheques—knowing exactly how we stand and how we do things. It is that which gives us our strong position, and which enables us to carry on. While we are able only to pay what I venture to suggest is a miserable return of 3 p.ct., we shall go on doing our best to get back to the old *régime* by getting a fair sliding-scale applied, and we shall continue to work in harmony and provide the commodity which the customer requires, and shall have. [Applause.]

A SHAREHOLDER asked if the dividend could not be paid in full—that was to say, free of income-tax.

The CHAIRMAN: We are entitled by Parliament to pay a certain dividend, and that dividend is subject to tax. I understand the suggestion is that the dividend should be declared free of tax. We cannot do that, as it would not be permitted by the authorities. A lady shareholder asks whether we could not give up paying the war bonus. My answer is that all our war bonuses have been converted into labour rates, and these rates are neither higher nor lower than those which are customary in the trade. We should not pay higher wages—there is no justification for it; and we cannot pay lower wages. With regard to the form in which the accounts are submitted, we are governed by the authorities. The Board of Trade have a careful Audit Department; and the Auditors examine the Company's accounts at regular intervals. You will notice that one of the signatures is that of Sir Alfred Bateman, the Official Auditor of the Board of Trade. Before I put the resolution, I may say we have prepared a little leaflet which gives some information with regard to coal prices which cannot but be useful to the average person; and I trust on leaving this hall you will take a copy away with you.

The resolution was put and carried unanimously.

The CHAIRMAN: That, ladies and gentlemen, completes the business of the meeting.

VOTES OF THANKS.

Mr. C. WEBB had much pleasure in proposing a cordial vote of thanks to the Directors for their able management of the Company's affairs during the past half year.

A PROPRIETOR, in seconding the motion, said he thought that the Directors were in a very tight position; but he was sure they were doing their very best to pull the Company through.

The resolution was unanimously carried.

The CHAIRMAN: On behalf of the Board and myself, I thank you sincerely for this vote of thanks. It is, of course, possible for me to have spent this afternoon in throwing figures at your heads; but in so doing I think time would have been wasted. I assume you have confidence in your Board—you have a particularly strong one; and it is a better use of time if I deal with general principles than in the limited and unsatisfactory manner which is sometimes suggested. Before I sit down I would like to take the opportunity of proposing a vote of thanks to the staff who have been working for us so strenuously and efficiently. I cannot speak too highly of the staff. We have built it up over a long period of years; and I am sure we could not have a more admirable and efficient staff than we have.

A SHAREHOLDER seconded the motion, which was put and carried unanimously.

The SECRETARY (Mr. F. M'Leod), on behalf of the clerical department, in returning thanks, said he was sure the motion would be highly appreciated by all concerned.

Mr. G. M. GILL (Chief Engineer) assured the proprietors that their workmen, in these days of widespread unrest, were working very well indeed, and the relations between them and the Company were most cordial. This was a very happy position for the management; and no doubt it was the result of the Board's action in the past, aided by co-partnership. With regard to the women, he might mention that they now had only a fraction of the number they had last year; but he could not refrain from paying a tribute to the female staff for the excellent work they had performed during the war. Many of the women were now being replaced by returned men.

The proceedings then terminated.

A MINIMUM DIVIDEND APPLICATION BY HARROGATE.

Bill to be Promoted next Session.

At the half-yearly meeting of the Harrogate Gas Company, on Monday of last week (when dividends at the statutory rates were declared), the Chairman (Mr. F. Barber), who presided, said that he did not propose to deal with the working during the past half year, but to discuss the very important question of the financial position of the gas industry, and more particularly of the Harrogate Gas Company. He remarked: I suppose the gas industry must be regarded as one of the most organized industries in the kingdom. There are many organizations, technical and commercial, having for their objects the promotion and protection of its interests. They have all, from a comparatively early period of the great war, apparently been conscious that its financial stability was being seriously attacked; and finally it was realized that greater solidarity of the whole was necessary if the attack was to be met successfully. This solidarity it is hoped has now been attained by the creation of the National Gas Council. Down to the present time, however, none of these organizations has (so far as I know) asked in express terms for the relief which it considers would meet the case of all the undertakings engaged in the industry.

We in Harrogate have had some experience of legislation based upon the report of a Committee appointed by the Government, in an Act known as the "Statutory Undertakings (Temporary Increase of Charges) Act, 1918." In our case, if we are to wait until the relief prescribed by this Act comes into operation, we should be charging 6s. 8d. per 1000 c.ft. for gas; and the yield to the average investor in our gas stock would be 1⅜ p.ct. As recently as the 4th of July last a deputation waited upon the President of the Board of Trade (Sir A. Geddes); and though the case of the industry as a whole was most ably and clearly put by Mr. D. Milne Watson, the only object of the interview seems to have been, not to state the remedy required to meet the case, but to again ask the Government to prescribe one. It seems to me that, if there be a specific remedy which will satisfactorily meet the case of the whole industry in a General Act, we are much more likely to get it by the representatives of the whole industry putting it forward, and insistently pressing it as an act of common justice, than by leaving the responsible Government Department in the dark as to our actual requirements. I think the reason for the state of things in which we find ourselves as an industry is readily discovered when we realize that the legislative provisions governing the finances of each undertaking carrying it on are so various. Some are governed by the sliding-scale; others by maximum dividends; while others belong to local authorities. I am not concerned with the two latter.

The details of the sliding-scale applicable to those governed by it are almost as various as the number of undertakings to which they apply. It would seem to follow, therefore, that a remedy prescribed by a General Act might not afford the same incidence of relief to each undertaking. The sliding-scale, when it was introduced, proved to be the basis of an equitable arrangement in the circumstances then existing between the company and the consumer; but it is no longer so. Now that circumstances have entirely changed, and the foundations on which it was based have been completely obliterated, I cannot understand why the principle involved in a sliding-scale should be cherished as a basis for relief legislation. Even though Parliament could be induced to raise the standard price of gas under all sliding-scales so as to make the scale operate to give the proprietors the same return as pre-war, it would never secure to them, to my satisfaction, that minimum return on the value of their investments which they ought to have. It seems to me to be forgotten that the foundation of all gas legislation was the production and supply of gas, and that the restrictions with regard to dividends to be earned by the proprietors, and the prices to be charged for gas, were imposed in return for the privilege of the monopoly of supply, and the right to lay the pipes necessary to afford it along the public highways. The parliamentary arrangement must have been based on the supposition that the revenue from gas for lighting would afford the surplus out of which the standard price could be reduced and the standard dividends increased.

Look at our own case. In 1880, the Board of Trade granted us a Provisional Order by which the standard dividend on our "C" stock was fixed at 7 p.ct., and the standard price of gas at 5s. 6d. per 1000 c.ft.—our standard rates on the "A" stock being 10 p.ct., and on the "B" stock 7½ p.ct. By the sliding-scale then introduced, we were authorized to increase our dividend by 5s. p.ct. for every penny by which we reduced the price of gas below 5s. 6d., and were compelled to reduce the dividend in the same ratio for every penny by which the price of gas was increased above 5s. 6d. By the joint operation, however, of what are known as the auction clauses regulating the issue of new stock, and the confidence of the investor in it, the advantages which the latter might have gained by the increased dividend derived from any progressive reductions in the price of gas were counteracted

by the price paid for the stock. If the stock at the time of its issue, or at the time of its sale, was yielding a statutory dividend of 15 p.ct., the class of person (and the investors in gas stock are a class to themselves) taking it up would invariably be willing to pay for every £100 nominal stock £300 and upwards—being generally satisfied with a yield of 5 p.ct. or something less, in his reliance upon its stability and the small prospect of receiving 1 or 1½ p.ct. more in the course of a lifetime. You will see this borne out by the large amount of premium in the capital account which, though treated as part of the amount of capital authorized to be raised, carries no dividend at all. At the period referred to, there was no competing electricity supply service in the borough. It may, therefore, be said that when the sliding-scale was established we had a restricted monopoly.

If we look at the conditions on which the standards referred to were based, we find that the essential materials required in the production and distribution of gas were: Coal, 11s. 3d. per ton; fire-bricks, 68s. 6d. per 1000; cast-iron piping, £4 18s. 4d. per ton; and 5-light meters, 36s. 6d. to 50s. each. The receipts from gas and meter rents in 1879 (at 4s. 7·78d.) per 1000 c.ft. were £9351, against a total expenditure of £7578. What is the position to-day? We have no longer even the restricted monopoly upon which our legislation was based. In the year 1891 the Harrogate Corporation obtained from the Board of Trade a Provisional Order granting them corresponding rights to lay their mains under the highways, and to supply electricity in competition with our gas. At that time the Corporation were large consumers of gas, both at their municipal establishments and in the public lamps, the latter of which we were under a statutory obligation to supply at the lowest net price charged to any other consumer. In the year 1889 the revenue derived from the sale of gas to the Corporation for lighting and other public services was £756. In 1913 the Corporation paid us for gas £1327. In our last completed financial year (1918) the revenue from the sale of gas from the same source was £552. We have therefore now not only no monopoly, but competitors who were previously one of our best customers, and who will (and do) exercise the monopoly of supplying themselves with electricity in preference to consuming our produce.

But compare the prices prevailing in 1919 as against those on which the standard dividend and the standard price were fixed. Coal is now 32s. 7d. per ton; fire-bricks 170s. per 1000; cast-iron piping, £14 11s. per ton; and 5-light meters 60s. each. So that coal has gone up 189 p.ct. on the cost in 1880; fire-bricks, 148 p.ct.; cast-iron piping, 197 p.ct.; and meters, 64 p.ct.; while the cost of labour has, by Government awards since the war, increased practically 100 p.ct.

And again, taking the total receipts from gas as compared with the total expenditure, I find that while our expenditure for the current year will be £76,803, the total revenue from the sales of gas and meter-rents will only be approximately £57,376. So that at current prices—including the increase of 8d. per 1000 c.ft. from the last meter-reading—£19,427 has to be provided from other sources of revenue to balance the account before we begin to earn a profit. Looking at the same point in another way, I find the revenue from gas to total expenditure was, in 1880, 120 p.ct.; in 1918 it had fallen to 77 p.ct.; and in the current year it will be 72 p.ct. On the other hand, the net revenue from residuals to total cost of coal was, in 1880, 54·6 p.ct.; in 1918, 65·9 p.ct.; and for 1919 it will be 70·5 p.ct.

The gas engineer has in the past, I believe, reckoned the revenue from residuals only as an item reducing the cost of the coal. I regard it as the revenue of another branch of our business which in itself might be carried on without statutory authority. Whatever may be the sound commercial view as to the application of the revenue from the source referred to, I am quite convinced that much of the future financial stability of the gas industry depends upon the expansion of that item of our receipts. In any event, it comes to this, that the selling price of residuals is becoming a more and more important factor in determining the standard on which the price of gas is to be fixed. One cannot contemplate with perfect equanimity the effect which a slump in residuals might produce in the financial position of the industry. Apart from the great changes which have taken place in the circumstances since the financial clauses were imposed on the industry by Parliament, we must not forget that Parliament has also sanctioned the burdens which have brought it to the present parlous condition. Parliament is, therefore, under a strong moral obligation to remedy the wrong to which it has been a party. Without elaborating arguments in support, I think you will agree with me that a very strong case can be made for the general relief of the industry, and of our undertaking in particular; and I therefore ask your adoption of the following informal resolution:—

> "That the proprietors of the Harrogate Gas Company view with grave anxiety the enormous loss they have sustained by the depreciation of their ordinary stock, and the great damage thereby done to the credit of the Company, especially at a time when additional capital is imperatively required to bring the plant up to the capacity necessary for affording in the immediate future the supply of gas which the Company is compelled by Statute to give. They claim that such position is attributable entirely to the unprecedented advance in wages and the unparalleled increase in the price of coal and other material essential to the production of gas, as awarded and sanctioned by the Government. The proprietors therefore earnestly appeal to the Government to forthwith promote such legislation for the relief of the gas industry as will afford to the undertakings engaged in it—not the greater privileges accorded to the industries controlled by them during the war—but such measure of justice as will enable them to pay to their stockholders the rate per cent. on each class of stock yielded by the statutory dividend declared and paid thereon for the complete financial year ending in 1914 on the then value of such stock, believing that the future financial stability of the industry depends on such relief being speedily granted."

The Directors feel, however, that the position created, through no fault of our own, is now so critical that we cannot depend solely upon any relief which may be obtained by any General Act which may be promoted. In face of the fact that, though the "Temporary Increase of Charges Act" did in some cases operate to secure at least 3 p.ct. on the nominal holdings of proprietors in some undertakings, and yet would afford us no relief whatever until our proprietors were reduced to the miserable pittance of 1¾ p.ct., we are full of misgiving as to whether any other General Act will bring us the relief we need until we know its actual provision. We are, however, in this position—that if the announcement of the terms to be embodied in any General Bill are very long deferred, and when it is made we find they are not adequate to meet our particular case, we may, unless we are already prepared with a Bill, be too late to proceed in the next session of Parliament. I think you will agree that to be left in such a position might prove disastrous. The Directors desire, therefore, to be in a position with your full approval, should the exigencies demand it, to at once proceed with a Bill embodying such provisions as they may be advised would meet our case and are likely to be granted by Parliament. They feel that no provisions will secure the results desired which do not afford to the investor, if not a sure, at least a reasonable, prospect of an adequate return on the amount paid for his investment.

Before the war the gas investor was generally satisfied with 5 p.ct. on the price paid for his stock; and, notwithstanding all impressions to the contrary, he has always been compelled to be satisfied with very little more, after holding his stock for a considerable time.

I am sure you will be interested to know that the dividend on our "C" stock stood at 13½ p.ct. in 1891, and had only risen to 15 p.ct. in 1912, and remained constant at that down to 1916 So that the investor who held from 1891 down to 1916 only received for his reward an additional 1½ p.ct. Assuming that he bought at a price yielding on the then dividend 5 p.ct., he was only getting 5½ p.ct. on his investment after retaining it for a quarter of a century. Though the standard rates of the "A" and "B" stock are 10 and 7½ p.ct. respectively, their dividends have only increased by the same percentage for the same period. The Directors consider that, however loyal the gas investor may remain to his choice, he will not be satisfied to receive in the future less than 7 p.ct. on his investment. The investor in other industries expects a return corresponding with the increased taxation and cost of living; and as this is at least 100 p.ct., it would not be unreasonable for the gas investor to expect 10 p.ct. on the investment which prior to the war was yielding 5 p.ct.

It has been the policy of Parliament to allow all undertakings, except those engaged in the public utility services, to meet this increase. All we are asking is to be allowed to pay our proprietors the modest rate they were receiving in 1914. As I have already told you, 7 p.ct. is the standard rate of our "C" stock; and this is the lowest percentage which your Directors consider the proprietors of this or any other undertaking should receive on their ordinary stock. They therefore contemplate proposing to Parliament that the "A," "B," and "C" stocks of the Company should be converted into a consolidated common stock entitled to a dividend at that rate.

I have already explained that the standard rate of "A" stock is 10 p.ct., on the "B" stock 7½ p.ct., and on the "C" stock 7 p.ct. We think we have a strong case for the conversion of the whole into one class on the basis of the statutory dividends paid on each prior to the war. This means that the holders of each class of stock should receive consolidated stock of the nominal value yielding at its standard rate the statutory dividend paid on that class prior to the war—viz., 18 p.ct. on the "A," 15½ p.ct. on the "B," and 15 p.ct. on the "C." In order, however, that the incentive to good management may not be lost, we also intend to ask that any surplus profits earned may be applied in the like proportions for the increase of the standard dividends and the reduction of the price of gas, as our increased profits in any year were applied under the sliding-scale.

This proposal has already been put, on your behalf, before the Board of Trade. After hearing our case, it was suggested that we should formally apply to the department for an Order embodying them, instead of proceeding by Bill. This was done; but I regret to say that it was discovered that they went beyond the authority vested in the department.

The great difficulty in the way of its acceptance by Parliament appears to be that there is no precedent in gas legislation to support it. Our Parliamentary Agents have, however, discovered one Act in which the principle of a minimum dividend was provided for. But I am happy to say that I believe ample precedents will be found in Water Legislation—at least, for a fixed maximum dividend. The difference between what we propose and the principle embodied in Acts relating to water undertakings is that when the maximum dividend has been attained, the surplus profits must be applied in the rates charged for water. If we could obtain a secure 7 p.ct. on our stock, we should be very glad to accept a provision under which, when our stock had attained a maximum of 10 p.ct., we might be compelled to apply all further profits solely in the reduction of the price of gas.

We are informed that our prospects of success would be greatly enhanced if similar undertakings in the industry were prepared to support our proposals as a satisfactory solution of the difficulty. We have therefore approached the National Gas Council, and hope that through them it may be possible to secure the support of those undertakings whose circumstances correspond with our own. Should it be found that we had no prospect of succeeding on the lines indicated, we might then be compelled to drop our scheme of stock consolidation, and be driven to the undesirable expedient of continuing our sliding-scale. In that event, we could only ask for the standard price to be so increased as to enable us, under the sliding-scale operating on it, to pay our pre-war rates of dividend.

It is unnecessary for me to say anything further about the auction clauses beyond what I said in the earlier part of my speech referring to the resolution.

Several shareholders afterwards expressed their hearty approval of the Chairman's remarks, and their strong opinion that the Government should introduce without delay such legislation as would put gas undertakings in as sound a financial position as they were before the war.

PORTSEA ISLAND GAS LIGHT COMPANY.

The Meeting of the Company was held last Thursday—Mr. T. H. F. Lapthorn (the Chairman) presiding. Before proceeding to discuss the accounts he made sympathetic reference to the death of Mr. Robert Edgcombe Hellyer, who had been a member of the Board for 26 years, and Chairman for ten years, and who, during the whole of his connection with the Company, had made its affairs his special interest, and had in this way acquired a mastery of the details of its business which none of his colleagues could pretend to equal. He had exceptional administrative ability, was always to the point and never wasted time or words, but was invariably courteous and impartial when presiding over meetings. His loss would be felt for many years to come, and he asked them to carry a vote of sympathy with Mrs. Hellyer and her family. This was done in the usual manner.

Turning to the accounts, the Chairman said the figures of the half year showed a general increase all round. Their consumers had increased by 359 to 51,804; hired cookers by 785 to a total of 36,028, and hired fires and radiators by 504 to 4797. These figures were reflected in the increased quantity of gas sold—77 million c.ft., to a total of 886 millions, or close on 10 p.ct. In part this increase was due to the shortage of coal, and partly to other causes to which he should have to refer. Sales of gas brought in £35,647 more than last year, partly due to an increase of 6d. over the charges during a portion of last year, and partly due to increased sales. Public lamps were responsible for an increase of £2532, due to the fact that they were now all being lighted, whereas part of them were suspended during the war. Other miscellaneous increases, excluding residuals, accounted for £687. The sale of residuals showed a considerable increase (£13,884); the cause being first economy in manufacture whereby a smaller quantity of coke had been used in their own works, and consequently they had had a larger quantity to sell, and what they had sold had been sold at a higher price than formerly. Dealing with the expenditure, he showed that coal and oil were up by £10,816; carbonizing wages had gone up £2535; and repairs and maintenance of works and plant, by £13,011. They were now overtaking repairs, &c., which they had been unable to do during the war. The same explanation accounted for an increase of £4089 in the repair and maintenance of mains, services, meters, and stoves. A sum of £8600 had been provided for extraordinary renewals. This was towards the liquidation of some extensive repairs for which during the war they been unable to make any financial provision; but now it was proposed to set aside at least £5000 a half year for the purpose, until the sum of £27,822 had been provided and paid off. As a result, their total expenditure had increased by £41,363; and they were left with a sum of £19,764 to transfer from the revenue account to the profit and loss account. They started the half year with a balance of £1613 to the credit of the profit and loss account. Adding to this a sum of £19,764 transferred from the revenue account, and also the sum of £6198 for income-tax, would leave them with sufficient to add a further instalment to the building-up again of the insurance fund, which disappeared during the war. Therefore they transferred to this account £2258, which was all the law would allow them to transfer at the present time. This would leave them with sufficient to pay their interest charges, and the dividends recommended, and provide them with a balance of £11,400 with which to start the profit and loss account in the new half year. Replying to the charges of profiteering on the part of gas companies, he emphasized the fact that shareholders in the concern were only getting 2⅞ p.ct. on the money invested during the last forty years, having regard to the amount of premiums paid on the purchase of their stock. Coal, oil, and labour accounted for between 70 and 80 p.ct. of the total revenue expenses, and if they compared the figure now with that of 1914, they would see at a glance exactly what the war had cost them in these respects. Not including the recent additional 6s. per ton, the price of coal had increased by about 150 p.ct. on the price of 1914. Oil was at one time as much as 300 p.ct. more, but happily it had dropped. Labour was over 100 p.ct. in excess of what it was in 1914. But the increase in the price of gas had been only 78 p.ct. Standing by themselves, the figures would have justified a reduction in the price of gas, and the Directors would have recommended it. But certain factors intervened which would prevent it. There was the increase of 6s. per ton of coal, which would cost the Company £33,000 a year; but that would have been offset to some extent by the better price they expected to get for their residuals, though a net increased cost of £23,000 was estimated. But the gas undertakings of the South had been prevented by the Coal Controller from getting their supplies of the most suitable coal from Newcastle and neighbourhood, and were driven to seaborne coal from Durham, which was more costly and less suitable for their purpose than Newcastle coal. It would probably mean to them an additional loss of £27,000 a year, or an equivalent of 10s. per ton. Another matter which most affected them, however, was the demand on the part of the gas workers throughout the country for an advance of 10s. per week on their present wages. Thus they could not only make no reduction, but there would be a further increase in the price of gas in September.

The report and accounts were adopted, and the usual dividends were declared, ranging from 7½ to 5 p.ct. on the different classes of shares. Votes of thanks were accorded to the Directors, Mr. H. A. Stibbs (the Secretary), Mr. T. Carmichael (the Engineer), and the remainder of the staff, for their able management of the affairs of the Company.

Wandsworth, Wimbledom, and Epsom District Gas Company.—In the half year ended June 30 there has been an increase in the sale of gas of 3·1 p.ct. over the corresponding period of 1918. The accounts to be presented at the meeting this day week show a profit on revenue account of £43,235; and, after providing for interest on the debenture stock and mortgages, and on deposits and loans, there remains to the credit of the profit and loss (net revenue) account an amount of £33,422. The Directors therefore recommend that dividends be declared at the statutory rates. They had confidently hoped to reduce the price of gas from Midsummer, and had, indeed, given notice to this effect; but in view of the announcement of the Government that the price of coal would be raised 6s. per ton, this has been withdrawn.

SERIOUS OUTLOOK FOR THE GAS SUPPLY OF WORTHING.

An Explanatory Letter from Mr. Stephenson.

[From the "Worthing Gazette."]

We have been warned how seriously all sorts of industries are likely to be affected by the recent unrest in the mining world; but the position does not yet appear to be sufficiently appreciated, and we accordingly welcome the accompanying characteristically frank statement from Mr. Sidney O. Stephenson, the Engineer and Manager of the local Gas Company, showing how Worthing is likely to be prejudiced by the disturbing condition of things that has arisen. Mr. Stephenson writes as follows:

It is desirable that the public should be made acquainted with the present precarious condition of the gas supply, and the reasons therefor, as well as the prospects for the future.

Our regular supply of gas coal comes from the Yorkshire coalfields; and these have, as is well known, been closed-down for several weeks owing to the miners' strike in the district. We have, in consequence, been receiving no coal, and are now reduced to a very small quantity of poor stuff which the Coal Controller sent in some time ago.

We are unable with this to produce the quality of gas we should like; and unless the delivery of coal is resumed, the gas supply cannot be maintained more than another week. Fortunately, we have been notified by both our contractors that they are sending consignments, and are hoping that these will arrive in time to avert a stoppage.

As to the future, the Coal Controller has thought fit to interfere with freedom of trade, and has given notice that henceforth all coal for the South of England for industrial purposes will have to be seaborne from Durham!

This means, firstly, that in place of our proper gas-making coal, we shall have to take inferior material; and secondly, an enormous increase in cost, which must raise the all-round living expenses of the unfortunate Southerner. The extra cost of the coal will not be less than £1 per ton, inclusive of the 6s. already granted.

The explanation of this grossly unjust order is the necessity for encouraging the coastal shipping trade. Most of us are of opinion that the shipping trade is already making sufficiently huge profits without requiring Government assistance.

Incidentally, the order mainly benefits one firm, in whose hands the bulk of the coastal shipping of coal lies. The Coal Controller has been most kindly disposed towards this firm all through. We, in common with other companies, have been notified by him that he has instructed him to deliver coal to us for which we have had to pay extremely heavy prices.

It is interesting to note that each letter has contained a sentence pregnant with grim, sardonic humour: "Price is of secondary consideration"—to whom, has never been explained.

I, and others, have written the Controller, demanding to know what profit was allowed to this much-favoured firm. This query has received no answer; but I can give figures which will be of interest to the public, and from which they can draw their own conclusions. The freight charged from the Tyne or Tees to the Thames by the shippers, and allowed by the Government, is 12s. 9d. per ton, and does not include unloading or harbour dues. The big London Gas Companies and others owning their own boats have kindly supplied their costs. Inclusive of unloading, &c., and allowing fully for depreciation, insurance, interest on capital, and all proper charges, they find the cost of freight over the same route to work out to 5s. 8d. per ton. This is a very wide margin; and the discrepancy becomes greater as we get round the coast.

The order has resulted in the Littlehampton Gas Company advancing their price a further 2s. per 1000 c.ft.; and if it is persisted in in its entirety, undoubtedly a big increase will have to be made in Worthing.

Lest anybody should think that the Gas Company can take advantage of the advance to do a little profiteering on their own account, it is as well to explain that under our Acts of Parliament every increase in price means a reduction in the dividend which may be paid. A similar increase to Littlehampton would mean the reduction of our dividend to less than 1 p.ct.! We shall not make any increase except under sheer compulsion, and are fighting the order as far as we can.

I have been in correspondence with our member (Earl Winterton), and protested strongly against the exploitation of the public of the South of England for the benefit of the shipping or any other trade; and he, with other south country members, has taken up the case.

I need hardly point out, however, that the greater the volume of public opinion which is brought to bear upon the Government, the greater the effect; and I would strongly advise everybody residing in the South to write to his Member of Parliament demanding that the order shall be rescinded. Remember, it is not only gas which is affected—the order applies to all industries, and therefore affects the cost of living in many directions.

Chester United Gas Company.—The report which was adopted at the half-yearly meeting of the Company, covering the six months to June, stated that there was a balance of profit of £4127 available for dividend on the ordinary stock, after providing for interest on the debenture stock and dividend on the preference stock. The Directors therefore recommended the payment of an interim dividend on the ordinary stock at the rate of 2½ p.ct. To meet the extra outlay involved by the constantly increasing costs of materials and rates of wages, the price of gas has been increased to 4s. 2d. per 1000 c.ft.; and the recent increase of 6s. per ton in the price of coal will necessitate a further advance in the price of gas. This matter will be considered by the Directors in time to become operative after the Michaelmas quarter. The Mayor (Sir John M. Frost), who presided at the meeting, said the make of gas per ton of coal had been better. It would be necessary to increase the price of gas, to meet the higher cost of coal; but he hoped this rise would not be large.

WIDNES GAS SUPPLY.

Effect of Home Bread Baking.

At a Meeting of the Widnes Town Council last Tuesday, Mr. Millar asked whether the Chairman of the Gas and Water Committee was aware that there had been abnormal difficulties in regard to the supply of gas, especially during the previous week; and whether the difficulties were temporary or permanent.

In reply, Alderman Timmins said he understood that no complaints had been received at the gas-works about the quality, and no cause was known why there should be. Mr. Millar stated that the supply had certainly been inadequate; and serious complaints had been made all over the town. He was simply anxious to know whether there was any special cause, and whether they had good prospects for the coming winter. Alderman Timmins said there was no special reason why the supply should be worse last month than in the previous month. The Mayor (Mr. George Davies) pointed out that during the past week there had been a large number of people who had had to bake their own bread, as a result of the bakers' strike; and in consequence there had been a greater call upon the gas plant. He expected that the usual number of complaints had been received about the pressure. After breakfast the pressure was reduced, to save loss through escapes; and there was not sufficient gas to meet the requirements the previous week.

STOCKPORT GAS DEPARTMENT.

Engineer's Annual Report.

Reporting on the working of the gas department at Stockport during the year ended March last, Mr. S. Meunier, the Engineer and Manager, says coal prices were further advanced by 2s 6d. per ton as from June 24, and by an additional 1s. 6d. as from July 8, making a total increase of 4s. per ton for the better part of the financial year. In April, 1918, the Committee on Production made an award increasing the war bonus to workmen from 12s. to 20s. per week, or 1s. 4d. per shift, *plus* 12½ p.ct. on time rates, and 7½ p.ct. piece rates on total earnings, dating back to March 28. In August of the same year, a further application for 10s. per week was received by the National Gas Council from the National Federation of General Workers. They called meetings of representatives of all gas undertakings in the United Kingdom; and it was ultimately decided to appoint a Sub-Committee to negotiate with the Union representatives on terms and lines suggested at the meeting. These resulted in an agreement being arrived at for an increase of 3s. 6d. per week, or 7d. per shift, making 23s. 6d. per week *plus* the 12½ p.ct.—the latter also counting in for all overtime worked. Similar negotiations, after the same preliminary steps, again took place in January of this year, resulting in a further addition of 5s. per week, or 10d. per shift, making the total increases granted to date 28s. 6d. per week *plus* 12½ p.ct. on total earnings for all day workers, or an increase over pre-war rates of 35s. 6d. per week, equal roundly to 129 p.ct., at which level wages at present stand.

In spite of every effort, it was found impossible to give the same adequate pressure as in pre-war days throughout the autumn and spring; and during the heavy months of December, 1918, and January and February, 1919 it had to be still further reduced in order to afford consumers anything like a continuous supply. This, naturally, had a strong effect on gas sales. The difficulty was further accentuated by the absence of men through the influenza epidemic, and other reasons necessitating ovens being shut-down for one or more shifts nearly every day through the heavy season. Ovens were shut-down on 130 days during the year, showing an average of 4·6 ovens, equivalent to about 55 tons of coal per day. For the whole year, the average was 1·7 ovens per day, equivalent to about 20 tons, or in the aggregate 7300 tons of coal. This shutting-down had a serious effect upon the total amount of coke made for sale, as the fires and heats had to be kept up by fuel brought in from the storage bunkers or stack.

During the year, the Government relaxed the restrictions upon the importation of pyrites, which at once re-acted upon the price previously obtainable for spent oxide, and so restricted the demand, while not affecting the cost of sulphuric acid—this still remaining under Government control. At present there is practically no sale for spent oxide, while the price of new is up about 45 p.ct. over pre-war.

The restrictions (and the consequent effect on unaccounted-for gas) as to the purchase of new meters continued through the whole year. Some idea of the importance of this question may be formed from the fact that nearly 6000 computations had to be made during the year; while, without being able to ascertain the number of meters gradually going slow in their registration, there must at one time have been from 2000 to 3000 not registering at all. The embargo was removed on March 31; and orders were at once placed for 1500 meters, and those out of order brought in and sent away for repairs.

The increase in sales of gas which it was hoped might be realized did not materialize; but, on the contrary, there was a further decrease over the previous year of 13,603,000 c.ft., equal to 1·89 p.ct. The total decrease in output for the year ended March 31, 1919, over that for 1914 amounts to no less than 134,012,000 c.ft., or 15·70 p.ct. This decrease in itself represents an additional cost, on standing charges alone, of nearly 4d. per 1000 c.ft. A comparative analysis of costs for the years 1914, 1918, and 1919 shows that coal and handling alone accounts for an increase of 1s. 2½d. per 1000 c.ft.; wages, 10½d.; and materials, nearly 4½d.—or a total of about 2s. 5½d. per 1000 c.ft. over the year ended March 31, 1914.

The revenue account shows increases on gas sales £23,328, coke £2023, tar £1267, and spent oxide £449; but decreases on concentrated liquor and sulphate of ammonia £1806, sundries £277, and benzol £48—the net gain on residuals amounting to £1608. The total increase in revenue amounts to £27,773. On the expenditure side, manufacture of coal gas shows an increase of £19,378; coal accounting for £11,672 of this, and wages for £6476. On the manufacture of carburetted water gas there is a decrease of £5362 in the cost of oil, due to the quantity used per 1000 c.ft. generated being kept down to the lowest possible limit; while there is an increase in wages and coke of £1239. The net saving on this item is £4123; but there has been diminished revenue in consequence of the large increased percentage which had to be made. The maximum reached was 46 p.ct. Had it not been for this, more coke would have been available for sale; and the replacement by coal gas would have given additional quantities of tar, ammoniacal liquor, and benzol.

There has been a heavy decrease in the sales of tar, liquor, and benzol, due to the reduction in the quantity of coal carbonized. This shows a diminution of nearly 2000 tons on the year. During the period from February, 1917, to November, 1918, the department turned out 90,304 gallons of crude benzol and 797 tons of concentrated ammoniacal liquor of 25 p.ct. strength for war purposes.

The general outlook for the industry is still most uncertain. Wages are consistently on the increase; materials and apparatus of all kinds have gone up by, in many cases, 200 p.ct.; and the anticipated diminution in the output of coal and the foreshadowed advance in price equivalent to at least 25 p.ct. on current rates, give rise to very grave misgivings as to the ultimate outcome. It is certain that the only outlet is in the direction of more economical working; and this must, of necessity, lead to heavy capital expenditure being incurred, so as to bring into use the latest and most up-to-date plant of every kind at the earliest possible moment. Practically every undertaking in the country whose plans for extensions were held-up by the war is now speeding-up in this direction; and it is certain that if the Stockport Gas Department is to retain the prosperous position it held in the past, this necessary and heavy expenditure must be faced and incurred. At the same time, in view of the fact that the costs will be from 120 to 140 p.ct. higher than pre-war, it would appear advisable for the Local Government Board to be asked for an extension of their present scale of redemption period.

The total quantity of gas made during the year was 819,315,000 c.ft., as compared with 835,516,000 c.ft. the previous twelve months; the make per ton of coal carbonized having been respectively 10,695 c.ft. and 10,701 c.ft.

LEIGH (LANCS.) GAS ACCOUNTS.

Mr. F. Bowen, M.Sc., the Engineer and Manager, has presented to the Leigh Corporation Gas and Water Committee his fourth annual report, covering the year ended March 31.

He points out that the gross profit on the gas department is £12,103, being 6·51 p.c. on the capital invested in the undertaking. This, after deducting the sinking fund and interest charges (£10,852), equal to 1s. 2·11d. per 1000 c.ft. of gas, leaves a profit of £1251. The profit is decreased by allowances on military service, depreciation of meters, and providing slot fittings, leaving a net profit of £905. Under the heading of rents, rates, and taxes in the revenue account, there is an increase of £1037; and this item has now reached the oppressive total of £6239, or 8d. per 1000 c.ft., as against 4d. pre-war. Under this item income-tax requires £3608. Over £3000 per annum in excess of pre-war is really being made as profit, but is paid over to the Inland Revenue.

On Oct. 1, 1918, the Household Fuel and Lighting Order came into force, and tended to a reduction of output for domestic purposes. But owing to demands for munitions, its effect was more than compensated for; and in consequence there was a slight increase in gas sold over the previous year, amounting to 1,108,700 c.ft. Previous to the armistice, the relative increase of output was very much higher. During the current year there is a decreased sale, which must be taken into consideration when the finances of the undertaking are reviewed. The average price obtained for gas was 6·53d. more than the previous year, due to the increases in price of 3d. and 4d. per 1000 c.ft. made at different dates. The make of gas per ton of coal for the year was 14,023 c.ft., as against 13,911 c.ft. in the previous year. Very little carburetted water gas was made.

The position in respect of coal during the heavy season caused the utmost anxiety, and stocks were at one time equal to only a few hours' supply of gas. Full pressure and supply were, however, maintained. The Coal Controller imposed two advances of 2s. 6d. and 1s. 6d. in June and July respectively, and carting rates also increased. Some loss of revenue was entailed by the interval which necessarily elapses before these charges could be transferred to the gas consumers. The net cost of gas per 1000 c.ft. into the holder was 18·67d., as against 13·57d. in the previous year.

During the year there were two bonus awards by arbitration, and recently time workers have been reduced from a 54½ hour week to a 47 hour week without reduction of pay. The wages of shift workers are now about 120 p.ct. over pre-war, and the wages of time workers about 130 p.ct., with hours reduced as mentioned.

The demand for gas again compelled the use of inclined retorts throughout the year; and in this connection it may be noted that the make per ton of 14,023 c.ft., was secured notwithstanding that the inclines, less efficient, took up 30 p.ct. of the load. Also it must not be overlooked that the vertical retorts are in their fifth year of continuous work.

As to residuals, a satisfactory feature is the buoyancy of the tar market, and enhanced prices were obtained. A general attempt was made (as yet unsuccessful) to establish tar distillation on a profit-sharing basis with the distillers.

The total quantity of gas sold was 184,608,000 c.ft., as compared with 183,499,300 c.ft. in the year 1917-18.

Dearer Gas at Runcorn.—The Directors of the Runcorn Gas Company announce that the price of gas, both to ordinary and power consumers, will be increased 8d. per 1000 c.ft. for the ensuing quarter. The present scale of discounts for prompt payment will remain in force. The amount of gas supplied through prepayment meters will be reduced from 20 to 16 c.ft. for 1d., subject to a discount of 3d. per 1000 c.ft.

AIRDRIE CORPORATION GAS-WORKS REPORT.

Increased Cost of Working.

At the last Monthly Meeting of the Airdrie Town Council, the Gas Engineer and Manager (Mr. A. Kellock) submitted his annual report, which stated that during the past year the amount of gas made was 124,286,000 c.ft., as against 124,905,000 c.ft. in 1917-18, a decrease of 0·49 p.ct. The coal carbonized amounted to 10,633 tons, compared with 11,085 tons, a decrease of 452 tons. The yield of gas per ton of coal was 11,688 c.ft., as against 11,267 c ft., an increase of 421 c.ft. on the previous year. The total gas sold was 109,077,400 c.ft., compared with 113,501,575 c.ft. for the preceding year, a decrease of 3·89 p.ct. The unaccounted-for gas amounted to 6·23 p.ct., as compared with 5·12 p.ct. The total income of the undertaking was £34 880, against £28,060, being an increase of £6819. The expenditure under revenue account was £26,372, compared with £23,011, an increase of £3361. Deducting the expenditure under revenue account from the income, there is a surplus balance of £8401 to be carried to the credit of the net revenue account, to meet the annual standing charges. The total expenditure under net revenue amounts to £7659, as against £7425 last year. The amount at the credit of this account being £8408, as against a total contra of £9002 (which is inclusive of a debit balance of £1342 carried forward from last year) there now remains a debit balance of £594 to be carried forward to next year.

The Gas Committee in their minutes reported that steps had been taken with a view to obtaining plans and estimates for the installation of vertical retorts. Offers were submitted for a high-pressure governor, which was required in connection with the pressure-wave system of public lighting, and which it had been decided to adopt. The tender of the Bryan Donkin Company, Ltd., of Chesterfield, for the governor and valves, was accepted. On the estimated balance, ascertained months ago, of £906, the Committee recommended that the price of gas, from and after the August survey of meters, should be reduced by 2d. per 1000 c.ft. Bailie Goldie (the Convener) now informed the Council, however, that since the increase announced in the price of coal the Committee had had to revise their budget. In the original estimate the price of coal was £14,374; but the revised estimate at the advanced price of 6s. per ton was £17,294. Deducting the estimated increased income from coke of £1188, this made the net increased cost of coal £1732, and less profit on the original estimate £1500—leaving an estimated deficit of £232. He had some hope of an increase in the consumption, particularly for public lighting; but meanwhile the Committee recommended that the price of gas should continue as it is, and that there should be no reduction in price. He accordingly asked that the minute be remitted back to the Committee with powers. The Council unanimously agreed.

SOME RECORDS OF F.O.B. COAL PRICES.

At last week's meeting, there was distributed among the proprietors present a leaflet containing the following table of prices which the South Metropolitan Gas Company have paid for coal delivered free on board steamer in the North over the last twenty-five years. The leaflet says: By means of coal thus on the whole reasonably supplied, and with the aid of the co-partnership by which the employees have shared the responsibilities and benefits of management, the Company have been able to supply to the people of South London one of their necessities at a low and satisfactory price. Can no endeavour be made to apply the same principles, so successfully employed in the manufacture and distribution of gas, to the raising and distribution of coal?

Year.	Price of Coal f.o.b. Steamer.	Year.	Price of Coal f.o.b. Steamer.
	s. d.		s. d.
1894	6 9	1908	10 1½
1895	6 3	1909	8 8
1896	6 3	1910	9 7
1897	6 7	1911	8 9
1898	6 11	1912	11 10
1899	7 8	1913	13 2
1900	15 0*	1914	11 2
1901	8 8	1915	15 5
1902	8 9	1916	16 5
1903	8 1½	1917	16 8
1904	7 7½	1918	20 11
1905	7 8½	1919	23 0
1906	8 7	1919 July	29 0
1907	10 10		

* South African War.

It is added that the Company's co-partnership—a development of the profit-sharing scheme introduced in 1889—has a membership of 6000 employees, with an aggregate holding of over £430,000 of ordinary stock.

The British Gas Light Company at Hull has suggested to the Hull Corporation that their proposed new contract for public lighting should provide for an adjustment of the charges in the event of the cost of coal or the rates of wages being raised, or of any considerable reduction being made in the number of lamps lighted.

The Tottenham District Light, Heat, and Power Company have declared dividends for the half year ended June 30 at the rate of 5 p.ct. per annum on the preference stock, and the full statutory rate of 4½ p.ct. on the "A" consolidated stock and 3 p.ct. on the "B" consolidated stock—all less income-tax. In a letter which has been issued to the shareholders notifying the dividend, the Secretary (Mr. E. J. K. Fussell) states that it is the Board's intention at an early date to make application to the Board of Trade for relief under the Statutory Undertakings (Temporary Increase of Charges) Act.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 18.

The position of pitch remains very strong, and there are good inquiries for home and export. Solvent naphtha is in some demand, and the price is unchanged. Benzol is being freely taken as motor fuel. Creosote is from 5¾d. to 6d. net per gallon in bulk at makers' works.

There is nothing new to report with regard to sulphate of ammonia.

Tar Products in the Provinces.

Aug. 18.

The average values for gas-works products during the week were: Gas-works coal tar, 36s. 3d. to 41s. 3d. Pitch, East Coast, 63s. 6d. to 64s. 6d. per ton f.a.s.; West Coast—Manchester, 54s. to 56s. 6d.; Liverpool, 54s. to 56s. 6d., Clyde, 65s. to 70s. nominal. Benzol 90 p.ct., North, 1s. 8d. to 1s. 10d.; crude 65 p.c., at 120° C. 11½d. to 1s. 0½d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 8d. to 1s. 10d. Toluol, naked, North, 2s. to 2s. 1d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 11d. Heavy naphtha, North, 2s. 1d. to 2s. 3d. Creosote, in bulk, North, liquid, 5d. to 5¼d.; salty, 4½d. to 4¾d. Heavy oils, in bulk, North, 6d. to 6½d. Carbolic acid, 60 p.ct. 1s. 5½d. to 1s. 6d. Naphthalene, £15 to £17 10s.; salts, £4 10s. to £6, bags included. Anthracene, "A" quality, 7¼d. to 7½d. per minimum 40 p.ct.

FROM A MARKET CORRESPONDENT.

Tar Products.

Generally speaking, conditions remain quietly firm, and quotations have a tendency to advance. The Yorkshire colliery strike has been the factor of uncertainty; and although there are hopes that the miners will return to their work this week, it will be some time before the tar distilleries can recover from the effects of the stoppage. Pitch is very firm indeed; and Provincial makers are asking still higher prices. There are no large offers, and makers seem more inclined to keep their stocks for the autumn market than to sell at even current high rates. Of course, the continued hot weather is preventing bulk shippers from making their arrangements; and it is a matter of difficulty to estimate future prospects to-day. Crude tars are a trifle harder; and carbolics continue to improve. The value of crystals is now from 8d. to 9d. per lb.—one large buyer at 7¾d. was badly "left" during the past week; and, although allowance has to be made for an increased cost of production in comparison with even a few months ago when crystals were 4d. per lb. and crude 1s. per gallon, it would appear that makers of crystals could afford to pay up to 2s. per gallon for crude. This figure, it is said, has been set by tar distillers as the lowest at which it would pay them to take out more carbolic acid. This price cannot yet be obtained; but if they stick to their guns, it may very soon come along. Cresylic acid does not change; but creosote is a very strong market on the fuel scarcity. Solvent naphtha is not quite so good as a week ago; but heavy and crude are without alteration. Refined naphthalene is not much sought for; but there is rather more inquiry for crudes. There is no sale for pyridine. Benzol remains in very fair demand as a motor spirit, and large quantities are being sent across to Ireland. Other products are without change.

The range of quotations is as follows:

Benzol: 90% London 2s. to 2s. 2d., North, 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 9¼d. North; crude 60-65% 1s. 3½d. to 1s. 5½d.; pure, 3s. per gallon naked.

Carbolic acid: Crude 60's 1s. 6d. per gallon nominal; crystals, 40%, 9d. per lb. asked.

Crude Tar: London, 45s. to 50s.; Midlands, 44s. to 46s.; North, 44s. 6d. per ton *ex* works.

Pitch: London, 70s. to 72s. 6d. per ton; East Coast, 58s. to 62s. per ton; West Coast, 57s. to 60s., with Manchester 59s. 6d. per ton and Glasgow 60s. per ton; South Wales, 64s. to 68s. per ton.

Solvent Naphtha: London, 2s. 3d. Provinces average 2s. per gallon.

Crude Naphtha: Naked, 10d. per gallon.

Heavy Naphtha: 2s. 3d. per gallon.

Naphthalene: Refined, £15 to £17 per ton nominal; crude, £4 to £8, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d.

Creosote: London, 7¼d.; North, 5¾d. to 6¼d.; heavy oil, 6d. per gallon in bulk.

Anthracene: 40-45%, 7d. to 7½d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 2d. per lb.

Cresylic Acid: 95%, 2s. 4d. to 2s. 6d.; 97-99%, 2s. 7d. to 2s. 9d. *ex* works London, f.o.b. other ports.

Sulphate of Ammonia.

The strike in Yorkshire has greatly retarded the production of sulphate of ammonia, and some makers who have arranged exports may find difficulty in delivering. The result of the strike may be that, with the reduced production, it may be necessary to reserve the whole output for home uses. Prices for the period commencing Oct. 1 are now due for fixing, and are expected to be at least £1 per ton dearer.

Glasgow and its Gas Engineer's Salary.—The "Glasgow Daily Record" says: A difference of opinion as to whether the salary of the new General Gas Manager in Glasgow should be £1500 or £1300 exists in the Gas Committee of the Corporation. The difficulty has been got over by the decision that no salary should be stated in the advertisement; applicants being asked to mention what salary they desire.

The Ten Thousand Miles Benzol Test.

In "The Motor" last week [Aug. 6], we criticized the mythical statements concerning the use of benzol which appeared in a leading daily, and seemed to be fairly typical of the erroneous impressions regarding this fuel. As a means of demonstrating to the public that benzol contains nothing which is injurious to the engine, the Automobile Association will shortly undertake a test of 10,000 miles on a new touring car under conditions which will leave no doubt as to the exact effect produced by the use of this spirit. A new British car will be used for the test as soon as it can be obtained. A brand of benzol produced by one of the concerns belonging to the National Benzol Association will be used, and during the test subjected to analysis by Dr. Harold Colman. He will also from time to time analyze samples of the lubricating oil taken from the engine. The details of the test are being arranged by Captain R. H. Montgomery, the head of the Fuel Department of the Automobile Association and Secretary of the Joint Fuel Committee. The results will be certified by an independent observer or observers. It might be pointed out that chemical analysis will do all that such a test can prove. It is also late in the day to make a demonstration of the use of benzol when many thousands of users know that the "corrosive" properties frequently attributed to it are "moonshine." But doubtless it will help to impress those who still give credence to the prejudice and antagonism which was stirred up in an interested quarter when "The Motor" instituted its benzol campaign some years before the war.

Gas Shortage at Worthing.—The lack of coal supplies caused by the policy of the Government in compelling gas companies and industrial undertakings in the South of England to get their supplies by sea has resulted in the lighting of public gas-lamps at Worthing being suspended.

Weymouth Consumers' Gas Company.—At the half-yearly meeting next Thursday, the Directors will report that the quantity of gas sold during the six months ended June 30 was 79,108,000 c.ft., which is 2,375,900 c.ft. less than the output for the corresponding half of 1918—a decrease of 3 p.ct. After meeting the interest on the debenture stock, the balance at the credit of the net revenue account is £9338, out of which the Directors recommend the payment of a dividend on the ordinary stock for the half year at the maximum rate of 5 p.ct. per annum, less income-tax. Coal is difficult to obtain; and its price and the regulations with regard to transport are causing some anxiety. The increased cost can only be met by additional revenue; but the price of gas cannot be advanced unless further powers are obtained—the price now in force being the maximum allowed by the Company's Act. To be prepared for the altering conditions, the Directors purpose submitting to the meeting a resolution with a view to obtain the proprietors' sanction to an application to the Board of Trade under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, for power to raise the price chargeable for gas.

Croydon Gas Company.

The Directors, in their report to be submitted to the proprietors at the meeting on Friday, state that, as compared with the corresponding period of 1918, the quantity of gas sold in the six months ended June 30 last is less by 0·38 p.ct. In the half year the number of consumers has increased by 228, that of stoves on hire by 374, and 982 stoves (in addition to other appliances) have been sold to consumers. The recent advance of 6s. per ton in the price of coal by order of the Government, and the restrictions imposed on railborne supplies, together with the consequent increase in cost of materials, will place a further heavy burden on the undertaking; and to meet these expenses the Directors feel themselves obliged, though with great reluctance, to again increase the price of gas, which will accordingly be raised by 6d. per 1000 c.ft. in October. The effect upon the proprietors of the present high price of gas under the provisions of the sliding-scale, which was designed many years ago under circumstances wholly different from those which now prevail, creates an injustice which should, in the opinion of the Directors, be dealt with. The National Gas Council are taking steps to appeal to Parliament for further relief to the industry from the inequitable conditions which now exist. During the half year, £31,000 of "D" stock has, with the sanction of the Board of Trade, been issued at the fixed price of £80 per £100, to consumers and to persons in the employ of the Company. Resolutions will be submitted to the proprietors authorizing the Directors to raise such further capital (under the powers contained in the Company's Acts of 1904 and 1905) as may be required for the purposes of the Company. After providing for all fixed charges, there remains available for division a balance of £22,588; and the Directors recommend that the statutory dividends be declared for the half year. These will absorb £20,240, leaving a balance of £2347 to be carried to the next account.

Bournemouth Gas and Water Company.—At the half-yearly meeting on Friday, the Directors will recommend the payment of the statutory dividends, which will amount to £19,858, and will leave a sum of £17,183 to be carried forward. They report that the cost of coal and other materials and wages continues to advance; and further increases in the price of coal and freights which must adversely affect the current half year are already notified. The Directors are unable to control the expenditure under these heads. Notwithstanding the ever increasing cost of maintenance, the expenditure for repairs in the half year ended June 30 was materially reduced by the non-recurrence of certain items of expenditure in the corresponding period of 1918. The sale of gas shows a decrease of 2¾ p.ct.; but there are increased receipts under other heads. The Company's Bill was opposed in both Houses of Parliament; but it has now passed the Committee stage without serious amendment, and is waiting the Royal Assent. The parliamentary costs so far incurred have been charged to the profit and loss account. The balance of this account, including the sum of £19,151 brought forward, is £37,042.

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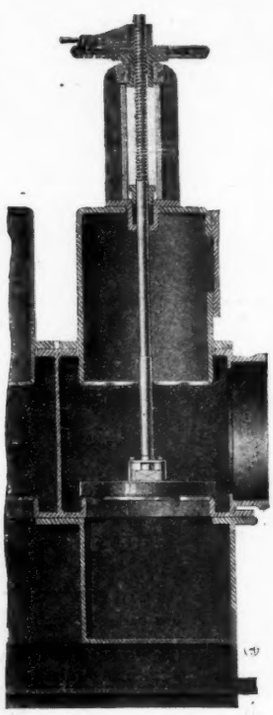

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Control and Initiative.

The vast increase since the start of the war in the cost of all kinds of commodities, and consequently in the cost of labour (because of the necessity of labour having more money to buy a given commodity), was the subject of an address by Mr. S. Insull, to the United States Independent Telephone Association. Looking at the matter from the point of view of public utility companies, he said the operating expenses of all undertakings had been affected by this world-wide movement; while, on the other hand, in most of the States the rates for service had not responded in anything like the proportion of the increase in the operating expenses. While feeling that it is impossible to pay too high a tribute to a great deal of the work that has been done by the Illinois Public Utility Commission, he remarked that the members are human, and it is perfectly natural that they should have an eye to the wishes of the communities affected by their decisions. He himself is a great believer in regulation of all public utility industries; but he can see that there are some serious drawbacks. For instance, when appearing before the Illinois State Commission in connection with a request for an increase in the rates chargeable by the local gas company, it was borne in upon him that one of the drawbacks of the future probably will be to check initiative, to make the utility manager hesitate as to whether he will try to put in hand a new experiment, and to place him in a position where he will be infinitely more cautious (if he has consideration for his own peace of mind) about whether he will care to branch out into some radically new departure. The Commissions were not created solely for the purpose of reducing prices; and, as a matter of fact, there have been an enormous number of cases in the different Commissions of the various States where rates have been increased. But it seems to them far more difficult to increase the price for service now than it was for them to reduce the rates chargeable by companies when the tendency of commodities was in the opposite direction. If, he concluded, we are to educate the public to a realization of the fact that it is impossible to get returns out of the public utility business where the rates are too low and the costs are too high, the only way to do so is by impressing upon them that the matter is one of common honesty of the community, and that there is absolutely no more justification for the employment of capital on a conservative basis of expenditure without a fair return in the public utility business than there is for its employment without a fair return in any other industrial enterprise.

Street Lighting Suspended at Hitchin.—The Hitchin and District Gas Company have suggested to the Urban District Council that, in view of the present difficulty in obtaining adequate supplies of coal and the grave diminution in reserves at the gas-works, street lighting should be discontinued for the next few weeks, or until the position improves. This would be of material assistance in maintaining the supply of gas to the public. As a consequence, street lighting is now stopped.

Australian Workers' Profit-Sharing Suggestion.

In an appeal to the Melbourne Arbitration Court, before Mr. Justice Higgins, the Federated Gas Workers' Industrial Union sought a share in profits. They put in a demand reading: "Members of the claimant organization to be paid interest equal to the dividend paid to shareholders—such interest to be calculated on wages earned." A witness named Hugh Robinson said he thought the claim fair and reasonable. His Honour: Would it not be equally fair to give shareholders a portion of your wages? Witness: That would not be possible, because we only get enough to live upon. His Honour: If you are to get the dividend the shareholders get, why shouldn't the shareholders get the wages you get? Witness: We are not asking for the whole dividend. Mr. Crofts (for the Union): Do you think the shareholders would get anything at all if you and others did not do the work? Witness: They certainly would not. His Honour: Would you get any work to do if shareholders did not put their money into concerns such as this? Witness: I think so. I recognize that shareholders are entitled to interest on their money; but if they get out of the profits more than a reasonable percentage on the amount invested by them, I think the employee should get just a little of it.

Local Authorities' Borrowing Restrictions Relaxed.

There has been issued as a White Paper the 44th annual report of the Public Works Loan Board, which opens with the welcome announcement to local authorities that the Treasury have decided that the control exercised during the war on their behalf by the Capital Issues Committee over the raising of new capital in the market need no longer be maintained, except as regards issues for capital purposes outside the United Kingdom. While, however, local authorities need not now obtain the sanction of the Treasury to capital expenditure, it is pointed out that the relaxation of restrictions on commercial undertakings will tend to reduce the capital immediately available for investment in loans issued by local authorities, and to increase the cost of such loans. For this reason, local authorities are advised to confine themselves to works that are urgently required, either in themselves or on grounds of unemployment. Except in one or two specified cases, authorities with a rateable value exceeding £200,000 must borrow in the open market. The rates of interest on loans granted out of the Local Loans Fund, otherwise than on the security of local rates, are: For periods not exceeding 30 years, 6 p.ct.; not exceeding fifty years, 6¼ p.ct. The Public Works Loans Commissioners during the financial year 1918-19 made advances for sums amounting to £122,226, as compared with £316,517 in the preceding year.

In view of the increased price of coal, the Warrington Town Council are recommended by the Gas Committee to apply to the Ministry of Health for an increase of 50 p.ct. in the statutory charges for gas.

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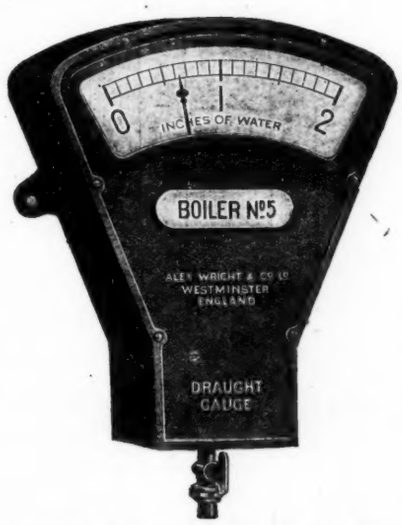

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Misuse of Gas.—At an inquest at Ashton-in-Makerfield, on James Sutton, aged 48, it was stated that he was found lying on the floor of his workshop with a gas-jet in his mouth. A verdict of "Suicide while of unsound mind" was returned. John Hodgkinson, aged 15, was charged at Oldham with having attempted to commit suicide by inhaling gas at a spinning mill where he was employed. Hodgkinson was found lying unconscious, but recovered later. He was allowed to go without penalty, on promising to behave well in future.

A Loss at Shrewsbury.—In their report on the working for the twelve months ended June 30 the Directors of the Shrewsbury Gas Light Company say the loss on the year's working amounts to £2194. There was no interim distribution in March; but the Directors recommend that a dividend of 2½ p.ct. (less income-tax) be now declared, for which purpose the reserve fund will be drawn upon. There has been a decrease of 1¼ p.ct. in the consumption of gas during the year. Reference is made to the resignation of Mr. W. Belton (after having been the Company's Chief Officer for a period of forty years), and to the appointment of Mr. C. M. O. Belton to succeed him.

Coatbridge Gas Company.—The Directors' report for the year ended June 30 showed (as recorded in last week's issue) a satisfactory balance, considering all the circumstances. The total consumption of gas for the twelve months amounted to 266,055,267 c.ft., being a decrease of 27,662,878 c.ft. on the corresponding period. The gas unaccounted for was 7·4 p.ct. The gross revenue from gas, residual products, &c., amounted to £65,681; and the capital expenditure on plant, &c., was £433.

Price at Arbroath Unchanged.—Mr. A. C. Young (the Gas Manager) pointed out the serious effect on the gas-works finances of the Arbroath Corporation Gas-Works of the increase of 6s. per ton in the price of coal, and expressed the opinion that the price of gas should be increased by 5d. per 1000 c.ft. The Gas Committee, however, reported to the Town Council that the Town Clerk had expressed the opinion that, in view of the terms of the Arbroath Corporation Gas Act, 1899, no increase of the price for gas could be made during the currency of the present year; and it had, therefore, been agreed to make no change.

STOCK MARKET REPORT.

The Stock Exchange has had a rather better week, and it is indeed a grateful task to be able to chronicle at last some signs of a break in the clouds which have now for many consecutive weeks made of almost every market a sombre abode of depression. The past week started favourably, for, although business continued for the first half of it to be at a very low ebb, yet the general tone was at once brighter. This happier state of things was emphasized from day to day until Friday witnessed almost moderate activity, coupled with some approaching cheerfulness. The spark that set this in train was the apparent awakening of our rulers to the country's financial position, and of our workers to the fact that ca' canny low-production tactics will not pay.

The gilt-edged market was firm. Home Government issues by small degrees gathered strength, and on Friday the 5 p.ct. Loan touched 94 5/16 and Consols 52⅛. National Bonds improved, and Indians were rather better. Home Rails were a very quiet market, but were calmly firm. Canadians were irregular, and Argentines rathur dull. The Foreign Market was more cheerful. French Loans plucked up a little upon a small recovery in the exchange, Chilian and Japanese were firm, and there was some inquiry for Russians.

In Miscellaneous, Rubbers did fairly well; but Oils were subjected to some ups and downs. Iron and Steel concerns and Textiles were in demand and Breweries were steady.

Business in the Gas Market was about the counterpart of the week before—dull and uninteresting. Three issues practically monopolized attention—viz., Gas Light ordinary, Imperial Continental, and South Metropolitan. Some six or eight other undertakings contributed a few bargains, none of them offering any feature calling for particular notice. Practically, there was no change in values from the preceding week; and changes in quotation were mostly attributable to *ex div* adjustments.

Bargains done for cash during the week were as follows: On Monday, Cape Town debenture 62, Gas Light Ordinary 51, 51¼, 51⅜, 52, 52¼, ditto 10 p.ct. Bonds 160, Imperial Continental 125, 126, 126½, Primitiva 32s. 6d., ditto preference 66s. 3d, 67s. 6d. On Tuesday, Bombay 5⅜, Cape Town debenture 63; Gas Light Ordinary, 51¼, 51¾, 52; Imperial Continental 126½; Monte Video 13; Primitiva preference 66s. 3d.; South Metropolitan 53. On Wednesday, Gas Light ordinary 51¼, 51½, 51⅜, ditto maximum 48; Imperial Continental 126, 126¼, 126⅜, 127; Metropolitan of Melbourne 96⅛; Primitiva preference 67s. 6d.; South Metropolitan 53; South Suburban, 76; Richmond 49½, 49¾; Toronto Consumers 155. On Thursday, Gas Light Ordinary, 51½, ditto preference 65; Imperial Continental 126, 127½; South Metropolitan 51, 52 *ex div.* On Friday, Bournemouth "B" 10 13/16; Cape Town debenture 63; European 12⅛, 14; Gas Light Ordinary 51½, 52; Imperial Continental 126½, 127½, 127¾, 128; South Metropolitan 50½, 51, 51¼, 51½, 51⅜, 51⅞.

In the Money Market rates were for the most part of the week firm, easing off towards the close. Discount did not relax. The Bank rate is 5 p.ct. as fixed on April 5, 1917.

The Falkirk Town Council have decided to have new Glover-West verticals installed as early as possible; and arrangements are being made for 32 retorts. A considerable increase in the quantity of gas is planned, with economy in labour.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share	When ex. Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
189,049	Stk.	July 31	4	4%	Aldershot 4 p.c. Pref.	..	60—65	..
1,551,868	"	April 8	2½	2½%	Alliance & Dublin Ord.	59—64	45—55	..
374,000	"	July 11	4	4%	Do. 4 p.c. Deb.	76—79	60—62	..
280,000	5	April 29	7½	8%	Bombay, Ltd.	5⅞—6⅜	5⅜—6⅛	5⅜
50,000	10	Feb. 26	16	12%	Bournemouth Gas and Water { 10 p.c.	29—30	19½—20½	..
888,110	10	"	7	7%	B 7 p.c.	15—15½	10½—11½	10 13/16
115,000	10	"	6	6/-	Pref. 6 p.c.	13¾—14	9½—10	..
159,740	—	June 27	—	4%	4 p.c. Deb.	..	65—67	..
992,045	Stk.	July 11	14	37/-	Brentford A Consolid.	261—266	62—65	..
784,920	"	"	11	31/8	Do. B New	204—209	55—60	..
55 000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	76—78	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—98	64—66	..
214,775	"	Feb. 26	11	7·3%	Brighton & Hove Orig.	208—218	137—142	..
244,200	"	"	8	5⅓%	Do. A Ord. Stk.	154—159	94—99	..
933,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
580,000	20	Mar. 26	12½	10%	British	44—45	30—31	..
120,000	Stk.	June 27	4	4%	Do. 4 p.c. Deb. Stk.	88—90	63—65	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	50—53	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2⅛	6⅛—6⅜	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	7—7½	..
100,000	Stk.	June 27	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	61—66	62—63
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,518,280	"	Aug 14	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	53—62*	..
560,000	"	"	5¼	26/8	Do. 3½ p.c. do.	103—105	57—60*	..
475,000	"	June 11	8	8%	Do. 5 p.c. Deb. Stk.	69½—71½	50—52	..
300,000	"	"	4	—	Continental Union Ltd.	76—79	43—48	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	65—70	..
51,600	Stk.	Aug. 29	14½	12½%	Croydon A 10 p.c.	..	155—165	..
278,400	—	"	11½	9%	Croydon B and C 7 p.c..	..	180—185	..
492,270	Stk.	—	6	6⅓%	Derby Con. Stk.	128—125	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,002,180	10	July 30	10	5/0	European, Ltd.	17½—18	14—15	12½—14
16,298,975	Stk.	"	4/17/4	30/-	Gas and Light and Coke { 4 p.c. Ord.	98—102	40—53	51—52½
2,600,000	"	"	3½	26/8	3½ p.c. max.	76—79	43—50	48
4,062,285	"	"	4	4%	4 p.c. Con. Pref.	96—99	66—68	65
4,674,850	"	June 11	8	8%	3 p.c. Con. Deb.	72½—74½	52—55	..
180,000	"	"	10	10%	10 p.c. Bonds	..	..	160
82,500	"	Mar. 12	5	4½%	Hastings & St. L. 5 p.c.	..	59—64	..
268,740	"	—	5½	2½%	Do. 3½ p.c	87—89	44—49	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	18½—18¾	7⅞—8⅜	..
86,600	Stk.	Sept. 12	9	8½%	Hornsey 7 p.c..	..	115—130	..
181,000	"	Mar. 12	7½	6⅔%	Ilford A and C.	151—154	90—95	..
65.780	"	"	6⅞	4½%	Do. B.	115—118	69—74	..
65,500	"	June 27	4	4%	Do. 4 p.c. Deb.	92—94	61—64	..
4,940,000	"	May 14	9	4½%	Imperial Continental	160—180	125—130	125—128
1,395,000	"	Aug. 14	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	78—80*	..
295,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	90—95	..
2,498,905	"	Feb. 26	10	42/6	Liverpool 5 p.c. Ord. { A	211—213	..	..
						146—148		
306,088	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,736	"	Aug. 14	7/5/8	32½%	Maidstone 5 p.c.	..	56—61*	..
75,000	5	June 11	6	5%	Malta & Mediterranean	4¼—4⅜	3⅜—3⅝	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	98—101	91—98	96½
					7 p.c.			
641,920	20	May 29	4	5%	Monte Video, Ltd.	11½—13	13—14	13
1,676,892	Stk.	July 30	4½	3½%	Newcastle&Gateh'dCon.	98½—99½	64—65	..
529,706	"	June 27	3½	3½%	Do. 3½ p.c. Deb.	87—88	57—58	..
15.000	10	Mar. 13	—	11%	North Middlesex 10 p.c.	..	13½—14	..
55,940	10	"	7/14/0	7/0	" " 7 p.c.	14—15	9½—9⅔	..
800,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—123	103—110	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	4⅜—6½	..
60,000	50	Feb. 26	13	7½%	Porisea, Island B	198—201	76—81	..
100,000	50	"	12	6⅔%	Do. C	118—121	68—63	..
249,980	5	April 29	8	—	Primitiva Ord.	5¼—5	1½—2	32/6
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4¾—5	3—3½	66/3—67/3
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—98	71—73	..
600,000	Stk.	July 30	4	4%	Do. " " 1911	..	49—52	..
846,198	"	June 27	4	4%	River Plate 4 p.c. Deb.	85—87	49—52	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7½—8	..
125,000	50	July 2	5	5%	{ 5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	5%	Sheffield A	228—224	83—87	..
209,984	"	"	10	5%	Do. B	222—224	83—87	..
529,500	"	"	10	4⅔%	Do. C	220—222	73—76	..
135,301	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	June 27	9	10%	South African	10½—11½	12½—13½	..
6,609,895	Stk.	Aug. 14	5/4/0	30/-	South Met. 4 p.c. Ord.	111—115	50—53*	50½—53
250,000	"	July 11	—	5%	Do. Pref.	..	94—96	..
1,695,445	"	"	3	3%	Do. 3 p.c. Deb.	72½—74½	53—54	..
224,220	"	Feb. 26	8½	5⅔%	South Shields Con. Stk.	157—159	99—101	..
952,795	"	Aug. 14	6	3⅔%	S'th Suburb'n Ord. 5 p.c.	114—116	74—77*	76
187,558	Stk.	June 27	5	5%	Do. 5 p.c. Deb. Stk.	116—118	88—91	..
647,740	"	May 14	7½	3⅔%	Southampton Ord.	99—102	67—69	..
121,275	"	June 27	4	4%	Do. 4 p.c. Deb. Stk.	..	63—65	..
190,000	"	Aug. 14		4½%	Tottenham { A 5 p.c.	135—138	83—88*	..
782,275	"	"	6	3⅔%	District { B 3½ p.c.	115—117	58—63*	..
181,255	"	June 26	4	4%	{ 4 p.c. Deb.	87—89	64—66	..
189,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	103½—109	83—85	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	"	Feb. 26	8⅜	55/-	Wandsworth A 5 p.c..	151—156	88—93	..
255,686	"	"	6¼	40/-	Do. B 3½ p.c.	129—134	65—70	..
108,075	"	"	—	38/6	Do: C	..	68—73	..
140,865	"	"	—	39/6	New Ordinary	..	68—73	..
353,000	"	"	6⅛	39/9	Wimbledon 5 p.c.	117—122	63—73	..
98,000	"	"	6¼	40/-	Epsom 5 p.c.	121—126	70—75	..
88,416	"	June 27	3	3%	3 p.c. Deb. Stk.	66—69	49—51	..

* Ex Div.

Gas Price and Dividend at Otley.—The Directors of the Otley Gas Company have decided to increase the price of gas from 4s. to 5s. per 1000 c.ft.; the increase to date from July 1. It is estimated that the dividend to the shareholders will have to be reduced from 4½ to 2¾ p.ct., in spite of the increased charges.

The Board of Trade announce that the import of British coal into Belgium is no longer subject to the import licence of the Belgian Government.

After having had the matter under consideration for some time, the Falkirk Town Council have now definitely decided upon the installation of four settings of eight Glover-West vertical retorts—making 32 retorts in all—at an estimated cost of £48,500.

An inquest has been held at Horseley Heath on the body of Frederick M'Gregor, who was found dead, shot through the head, in the strong room at the Tipton Gas-Works, where he was engaged as Chief Clerk and Cashier. He was stated to have been suffering, both mentally and physically; but the Coroner, in returning a verdict of "Suicide," remarked that he was not prepared to say whether the man was insane or otherwise at the time he committed the act.

An increase in rate takes effect at Largs, by an additional 1s. 3d., making the charge 6s. 8d. per 1000 c.ft. At Montrose, the increase is 8d. for lighting, making the rate now 6s. 2d. and for cooking 5s. 9d.

The Directors of the South Shields Gas Company have declared a dividend for the half year ended June 30 last (and payable last Thursday) at the rate of 2½ p.ct. on the consolidated stock and the new stock, and at the rate of 2 p.ct. on the ordinary stock—all less income-tax.

The death has been reported in the daily press of Mr. John Edward O'Sullivan Addicks, who began life as an errand boy in a Philadelphia store and afterwards made millions of dollars out of the flotation of gas companies, but who has died in poverty. At one time he was known throughout the United States as "Gas Addicks." He built gas-works at Brooklyn, Jersey City, Chicago, and elsewhere. His system was to obtain legal authority for laying gas pipes and producing gas, and then sub-let the contracts. By this means he made enormous profits. He was the prime mover in what was known as the "Chicago Gas Trust" in 1882, and made another fortune through the organization of the Bay State Gas Company two years later. Most of his operations in gas proved to be boomerangs, says the "Daily Mail," and involved him in litigation which finally ruined him.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under (about 40 words) 3s.; each additional Line, 6d.

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

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GAS PURIFICATION & CHEMICAL CO., LTD.,
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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
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SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD., Mark Lane, LONDON, E.C. Works—SILVERTOWN.
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A BRITISH Oxide Cheaper and Better than Bog Ore. 35 per cent. Water, 75 per cent. Ferric Hydrate.
For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

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J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 315 Oldham, and 2412 Hop, London.
Telegrams—
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BENZOL PLANTS FOR GAS-WORKS.

BAGLEY, MILLS, & CO., Ltd.,
92, Victoria Street, Westminster, S.W. 1, Invite inquiries from all Gas-Works making 75 million cubic feet and upwards per annum.

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmer's Green 608.

TULLY'S PATENT.
CARBURETTED HYDROGEN PLANT for 300 to 500 B.Th.U.

COMPLETE GASIFICATION OF COAL.
BALE AND HARDY, LTD.,
33, VICTORIA STREET, LONDON, S.W. 1.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CHEMICAL PLANT ENGINEERS, BOLTON, LANCS.
Telegrams—"SATURATORS, BOLTON." Telephone 0848.

EXTENSIONS.—Gas-Works requiring Alterations or Additions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, 15, Park Row, Leeds, who make a Speciality of Gas Apparatus, Coke-Oven Plant, and Structural Steel Work. Inquiries Solicited. Satisfaction Guaranteed. Telephone No. 22579, LEEDS.

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BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.

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Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.
Phone: Avenue 6680.

TAR AND GAS LIQUOR WANTED
IN LONDON DISTRICT.

THOMAS CLAYTON (Oldbury), Ltd.,
BRENTFORD, W.
Telegrams: Canal, Brentford. 'Phone: Ealing 17.

ENQUIRIES SOLICITED.

FOR Gas-Works Plant of Every Description; also SULPHATE OF AMMONIA and SULPHUR RECOVERY PLANTS.
C. & W. WALKER, LIMITED,
DONNINGTON, NEWPORT, SALOP.

HUTCHINSON BROTHERS, Ltd.
FALCON WORKS, BARNSLEY.

MANUFACTURERS OF
GAS METERS (Ordinary and Prepayment), "FALCON" INVERTED LAMPS for Street Lighting, INVERTED BURNERS and CONVERSION SETS for Street Lamps.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, May 27, p. 519.

JOHN RILEY & SONS, Limited, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 60 years. Reference given to Gas Companies.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, Rose Mount Ironworks, Elland.

JAMES MILNE & SON, LTD.,
(Established 1750.)
SLOT AND ORDINARY DRY METERS,
EXTENSIVE RANGE OF USEFUL GAS-WORKS' ACCESSORIES.
EDINBURGH, GLASGOW, and LEEDS.

MEWBURN, ELLIS, AND PRYOR.
CHARTERED PATENT AGENTS AND
TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent, London." 'Phone: 248 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

ALDER AND MACKAY, LTD.
(Established 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.
(See p. 416.)

CORRESPONDENCE TUITION in GAS ENGINEERING for City and Guilds Institute Exams. (Preliminary and Final). Successful Results. Low Fees.
Pennington's Engineering Tutors, 254, Oxford Road, Manchester.

APPOINTMENTS, &c., WANTED.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, has the FIRST CALL ON YOUR CONSIDERATION.

CAPTAIN E. W. Broadberry, M.C., 25 Years of Age, who is about to become Demobilized from the R.A.F., had Partly Trained as a Gas Engineer before the War, and will be glad to take up a Suitable Appointment in the Industry.
Offers, Communications, or Suggestions will be Welcomed, care of Mr. A. E. Broadberry, "Ellerslie," Buckhurst Hill, Essex.

WANTED—Position as Sales or Office Manager, Buyer. Representative, Salesman, Assistant Manager, or Foreman of Works, or Some Similar Post by a Young Man, 28 Years of Age, who has had Workshop and Drawing Office Practice, and General Experience in Buying, Selling, and Managerial Duties, Travelling, &c., for a Firm of Gas Appliance Manufacturers, and others. Recently has been engaged on very important Government Work.
For full Particulars, address No. 6731, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

APPOINTMENTS, &c., VACANT.

FOREIGN Correspondent of British Nationality wanted in Old-Established Chemical Business. Must have Thorough Knowledge of French, Spanish, and Italian.
Write, stating Experience and Salary Required, to No. 6727, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

WEYMOUTH CONSUMERS GAS COMPANY.

REQUIRED by the above Company, an efficient ENGINEER and MANAGER having a Good Practical Experience of Gas Manufacture and Distribution, and of the Manufacture of Sulphate of Ammonia. A Knowledge of Water-Gas Plant and Benzol Plant is necessary. Annual make of Gas, about 180 Millions.
Salary, £450, rising by annual increments to £550 per Annum.
Applications, stating Qualifications, Experience, and Age, accompanied by *copies* of not more than Three recent Testimonials, to be sent to the Chairman of the Company, 71, St. Thomas Street, Weymouth, on or before the 29th inst.
E. Y. Wood,
Secretary.
Weymouth, Aug. 8, 1919.

CORPORATION OF GLASGOW.
(Gas Department.)

THE Corporation invite Applications for the Position of GENERAL MANAGER of the Gas Department of the Corporation of Glasgow. The Person Appointed will, subject to the control of the Corporation and its Gas Committee, have Entire Charge of the Gas Undertaking, and will be required to give his Whole Time to the Duties of his Office, and must not Engage in Private Work of any kind. The appointment will be Terminable by either Part at any Time on Three Months' Notice.
Applications, stating Age, Salary required, Present Occupation, and Previous Experience, should be Printed or Typewritten, and be accompanied by *copies* of not more than three Testimonials. Applications will be Treated as Confidential, and Envelopes containing them should be Endorsed "General Manager, Gas Department," and be Lodged with the Subscriber on or before Saturday, Aug. 30, 1919. Canvassing Directly or Indirectly is Prohibited.
J. Lindsay,
Town Clerk.
City Chambers, Glasgow,
Aug. 14, 1919.

ASSISTANT Manager Wanted for Firm Manufacturing Gas Meters, Lamps, Lighting Fittings, and Gas-Works Apparatus. Gas-Works or Distribution Department Experience preferred but not essential. Must have had Good Technical Training. Good Salary will be paid able man with Initiative.
Write, giving full Particulars of Experience, &c., to No. 6717, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

APPLICATIONS are invited from Fully-Qualified and Experienced Young Men in the Gas Industry for the Position of ENGINEERING ASSISTANT AND CLERK OF WORKS on Forthcoming Extensions.
Candidates must have had Workshop and Drawing-Office Experience and Possess a Good General Knowledge of how to Deal with the various Problems of Gas Manufacture and Distribution.
Special Consideration will be given to those who have had Experience in the Construction and Supervision of Vertical Retorts.
Salary £400 per annum, without Bonus or other Emoluments.
Apply to No. 6730, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

WORKS Chemist Wanted for a 500 Million Works in the North of England. Applicants preferred who have had College and Works Training; the latter extending over Six or Seven Years. Duties shall include all usual Laboratory and Works Tests, Qualitative and Quantitative Analysis.
Salary, £200 per Annum, including War Bonus.
Apply, stating Age, Experience, Qualifications, &c., to No. 6732, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

WANTED—by a Firm of Gas Engineers a JUNIOR CHEMIST with Gas-Works' Experience.
State Age, Experience, and Salary required, to No. 6726, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

COUNTY BOROUGH OF BURNLEY.
(Gas Department.)

DISTRIBUTION Inspector (Internal) wanted to have Charge of the Sales and the Fixing of Gas Apparatus.
He must be Competent to Advise Customers on, and to Superintend the Fixing of, all kinds of Gas Apparatus. Salary, £250 per Annum.
Applications, giving full Particulars of Age, Training, and Experience, to be sent to the Gas Engineer, Gas-Works, Burnley, not later than Monday, the 25th of August next, endorsed "Distribution Inspector."
Peregrine Thomas,
Town Clerk.
Town Hall, Burnley,
Aug. 5, 1919.

COUNTY BOROUGH OF BURNLEY.
(Gas Department.)

ENGINEERING Draughtsman wanted accustomed to design Plant for Gas-Works.
Salary, £300 per Annum.
Applications, giving full Particulars of Age, Training, and Experience, to be sent to the Gas Engineer, Gas-Works, Burnley, endorsed "Draughtsman," not later than Monday, the 25th of August next.
Peregrine Thomas,
Town Clerk.
Town Hall, Burnley,
Aug. 5, 1919.

REPRESENTATIVE. — Firm Manu- facturing Gas-Meters, Lamps, Lighting Fittings, and Gas-Works Apparatus require REPRESENTATIVE for Scotland and Ireland. A good Connection is already Established; but a First-Class Man is required to Extend and Develop with Strong Selling Lines.
Applications, by letter, giving Full Particulars to No. 6718, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

GENERAL Foreman (Mechanically Trained) Wanted for Large Provincial Gas Company's Works in the South. Applicants Preferred having Experience in the Working and Control of Vertical Retorts, Electrical Plant, and Carburetted Water Gas. Wages Five Guineas per Week.
Applications giving Full Particulars of Training and Experience to be sent to No. 6729, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

WORKS-FITTER Required, used to General Repairs. Apply to the Manager, Gas-Works, Uxbridge.

STOKER wanted for Midhurst Gas- Works.
Apply to A. C. Richardson, Station Road, Midhurst.

WANTED—Gas-Stokers, Eight-Hour Shifts.
State Experience, Age, and Wages required, to the Manager, Gas-Works, Sidmouth.

PLANT, &c., FOR SALE & WANTED.

WANTED — English Manufactured PITCH and OIL, by Belgian Representative.
Address No. 6720, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

GASHOLDER Wanted, about 50,000 to 60,000 c.ft. capacity—Good Double Lift, 50 ft. to 60 ft. Diameter, preferred.
Address No. 6721, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

TO IRON FOUNDERS.

CASTINGS wanted, consisting of Specials for GAS CONNECTIONS, up to 24 in. dia., and CAST-IRON TANK PLATES.
Quote Price per Ton and Delivery to No. 6728, care of Mr. King, 11, Bolt Court, Fleet Street, E.C. 4.

PATENTS LICENCES.

THE Proprietors of British Patents Nos 25,516 of 1906. 25,588 of 1906, 11,152 of 1908, 28,943 of 1910, 4763 of 1912, 4772 of 1912, 8429 of 1912, 20,291 of 1912. 11,591 of 1914, 102,240 of 1916, 105,492 of 1916, and 106,899 of 1916, relating to the "MANUFACTURE OF INCANDESCENT GAS-MANTLES," desire to enter into Negotiations, with One or more Firms in Great Britain, for the SALE OF THE PATENT RIGHTS or for the GRANT OF LICENCES to Manufacture under Royalty.
Inquiries to be Addressed to D. Young and Co., Patent Agents, 11 and 12, Southampton Buildings, London, W.C. 2.

CONTRACTS OPEN.

CORPORATION OF CALCUTTA.
NOTICE TO CONTRACTORS.

TENDERS are invited, in duplicate, for the Supply of 2750 One-Light 15 in. SQUARE COPPER STREET LANTERNS, constructed from strong Copper Sheets throughout (unpainted), which must be made specially Insect and Dust Proof, Porcelain Reflectors complete, with Scroll Irons, without Ladder Bar and three Set Screws. These Lanterns must be of suitable size for single Inverted Incandescent Gas-Burner consuming about 3½ to 4 c.ft. per hour.
Separate prices to be quoted for ⅜ in. Brass Adaptation Fittings (seamless tube) with Unions complete, also 21 oz. Best Quality English Glass Panes for the above Lamps.
Samples of the Copper Lanterns (unpainted) should be forwarded (carriage paid) for inspection to the Superintendent, Corporation Lighting Department, 33 and 34, Wellington Street, Calcutta.
Tenders must include Cases and Packing, also Delivery Free of all Charges at the Corporation Stores, all articles to be Insured against Breakages and Marine Risks. Time for Delivery must also be stated.
Payment will be made for each Consignment when Delivery is accepted in Terms of the Contract which a successful tenderer is required to execute within two months from the acceptance of his Tender.
The Corporation do not bind themselves to accept the lowest or any Tender, and will be at liberty to accept the whole or part of a Tender.
No Tender will be considered unless accompanied by a remittance to the extent of 2½ p.ct. on the total value of such Tender. All rates should be quoted both in words and figures, and the Tender should remain open for acceptance for two months from the date of opening the same.
Tenderers must abide by the rules in regard to Tenders which are in vogue in the Corporation.
Each Tender, in duplicate, must be enclosed in a sealed cover and superscribed "Tender for Copper Street Lanterns."
Tenders will be received by the Deputy Chairman up to 2 p.m. on Monday, the 10th of November, 1919, when they will be opened in the presence of such Tenderers as may be present.
Tenderers may submit their offers on their own forms.
J. C. Mukerjea,
Secretary to the Corporation.
Central Municipal Office,
Calcutta,
July 21, 1919.

CITY OF CORK GAS CONSUMERS' COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the following PLANT:—
WATER COOLED CONDENSERS. Capacity—One Million cubic feet per Diem (preferably of cast iron).
STATION GOVERNOR, 18 in. Connections.
TEST GASHOLDER, about 10 c.ft. capacity.
For further Information, apply to the Engineer, Gas-Works, Cork.